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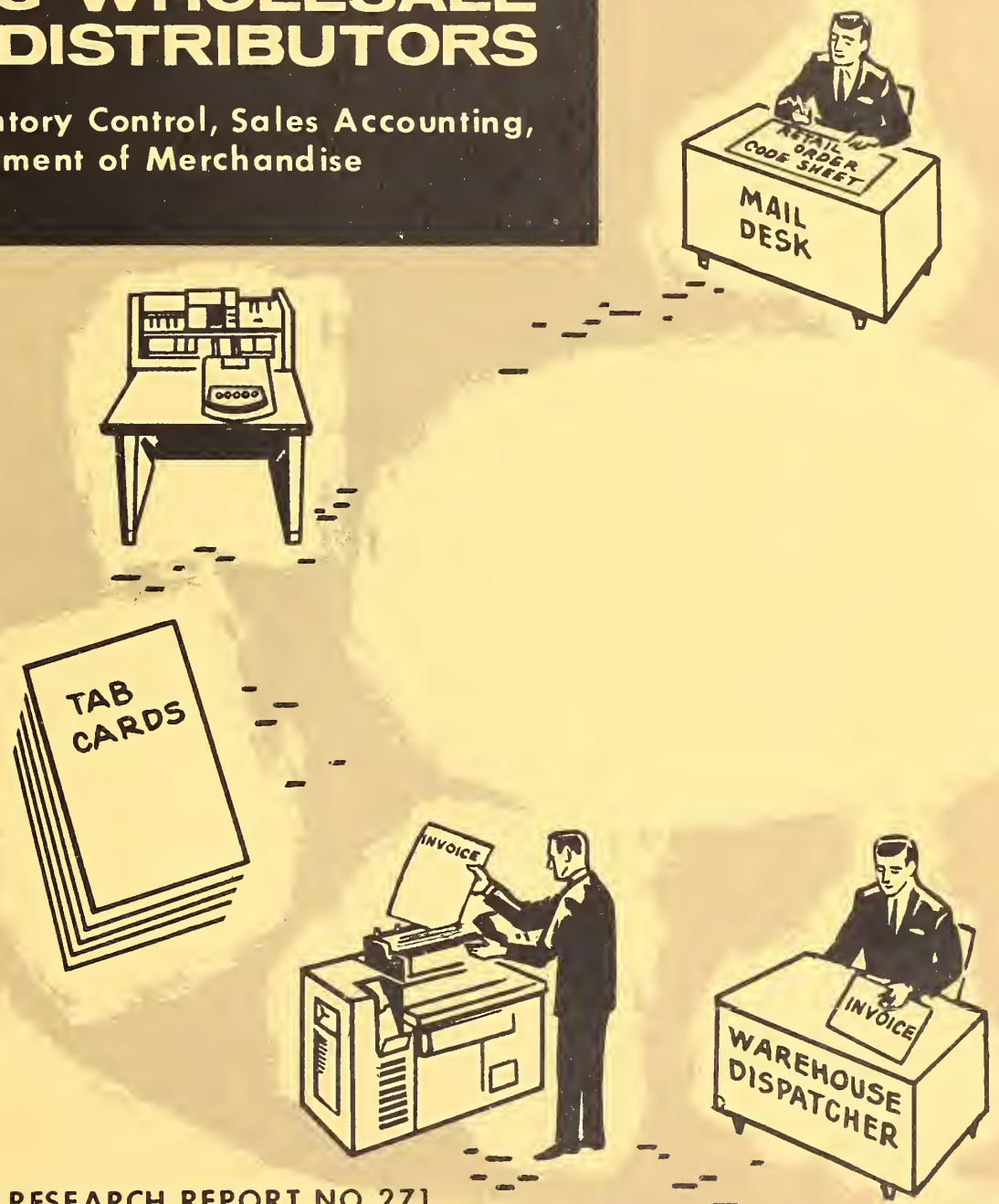
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U. S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
WASHINGTON, D. C.

IMPROVED METHODS AMONG WHOLESALE FOOD DISTRIBUTORS

For Inventory Control, Sales Accounting,
and Shipment of Merchandise



MARKETING RESEARCH REPORT NO. 271

U. S. DEPARTMENT OF AGRICULTURE
Agricultural Marketing Service
Washington, D. C.

PREFACE

The research on which this report is based was conducted by Frazer and Torbet under contract with the U. S. Department of Agriculture. The contract was administered by R. W. Hoecker, Head, Wholesaling and Retailing Section, Transportation and Facilities Branch.

This study on more efficient methods for inventory control, sales accounting, and shipment of merchandise is a part of a broad program of research aimed at reducing the costs of marketing farm and food products. Any cost reductions in the accounting departments of wholesale food distributors will contribute to lowering the overall cost of distributing food products.

It is necessary to make references throughout this report to brand names for understanding, clarity, and application of the subject matter. These references do not constitute an endorsement by the Department of Agriculture of the products mentioned.

Special credit is due the following wholesale food distributors who made their offices and personnel available for detailed study: John D. DuRoss Co., Cleveland, Ohio; Fairway Foods, Inc., St. Paul, Minn.; S. M. Flickinger Co., Inc., Buffalo, N. Y.; Gateway Grocery Co., La Crosse, Wis.; Godfrey Co., Milwaukee, Wis.; B. Green & Co., Baltimore, Md.; Hannaford Bros. Co., Portland, Maine; Klauber Wangenheim Co., San Diego, Calif.; Krenning-Schlapp Grocer Co., St. Louis, Mo.; Francis H. Leggett & Co., Buffalo, N. Y.; The Lewis Grocer Co., Indianola, Miss.; Milliken, Tomlinson Co., Portland, Maine; New England Grocer Supply Co., Worcester, Mass.; C. B. Ragland Co., Nashville, Tenn.; Red Owl Stores, Inc., Minneapolis, Minn.; Roundy's, Inc., Milwaukee, Wis.; Peter J. Schmitt Co., Buffalo, N. Y.; Slocum-Bergren Co., Minneapolis, Minn.; Super Valu Stores, Inc., Aberdeen, S. D.; and Tom Boy, Inc., St. Louis, Mo.

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SUMMARY

Research conducted in the accounting department of 20 wholesale food distributors throughout the country resulted in the development of improved methods of inventory control, sales accounting, and billing of orders to retail stores. Both manual and tabulating machine methods were studied. The way in which these office functions are performed has a direct influence on the costs of handling food at the wholesale level, and any reduction in these costs should contribute to lowering the overall cost of distributing food products.

Researchers, in studying the advisability of wholesalers converting from manual to machine methods of performing office functions, found that it is necessary to have a business volume of approximately \$6 million annually before automatic tabulating equipment would pay. The savings in overall costs would be principally the result of fewer sales lost due to "out-of-stock" and a reduction in warehouse labor requirements. As annual business volume increases above \$8 million, savings with use of automatic tabulating equipment over manual methods increase. Basic automatic tabulating equipment includes an accounting machine, sorter, card punch, and a reproducing punch.

Any department in a wholesale food distribution business, in order to operate efficiently, should use preprinted order books, whether manual or tabulating machine methods are used. Preparation and processing of handwritten invoices require more than 8 times as many man-hours as the order book method of invoicing. When preprinted order books are used, warehouse stocks are stored in the same sequence as they are listed in the order book. This increases productivity in order assembly.

It is recommended that wholesale food distributors use inventory control and turnover analysis procedures. With the manual methods of invoicing, sales should be posted on a tally sheet and this sheet stapled to each column of an office copy of the order book. The tally sheets are summarized weekly and quantities sold are posted in a combination buyer's record and inventory card.

In order assembly, when manual methods and the preprinted order book are used, warehouse stocks are stored in the same sequence as they are listed in the order book. Labor productivity in this case is 25 percent greater than when handwritten invoices are used and items are not listed in sequence.

In using tabulating methods for invoicing, a firm printing 100,000 invoices annually would reduce paper costs by more than \$2,800 per year by changing from a 3-copy invoice to a single copy invoice having a perforated side strip. In addition to reduced paper costs and reduced costs for filing extra copies of the invoice, the single copy invoice permits machine verification of accumulations and totals.

Out-of-stock reports in wholesale food firms are prepared with automatic tabulating equipment by either of 2 methods--the "commodity out" card, and "tally out" card methods. Researchers found that with the "tally out" card method the number of customers ordering an item can be tabulated and preparation of the out-of-stock report costs less than 36 percent as much as the "commodity out" card method. These advantages with the "tally out" card method

must be weighed against the inability to notify the customer on the sales invoice of those items ordered but not shipped.

In machine methods of performing office functions, limited travel distance and plastic card dividers having prongs increase card puller productivity. The greatest card puller productivity achieved in any firm was accomplished by using plastic dividers with prongs in the tub files, pulling cards from high to low with each receiving starting with the serial number "one," placing tubs (6 in this case) in an "L" pattern, and pulling orders from a short form retailer order. Card puller productivity with machine driven rotary card tub files is greater than with standard upright tubs and rotary tub files require less floor space than standard upright tubs.

Commodity card columns must be properly grouped for greatest efficiency and accuracy in the tabulating department. Card columns should be punched with information in the same sequence as it appears on the source document. With proper grouping of information, one firm reduced their manual key punching time 37 percent. The use of a 5-digit commodity code, instead of the frequently used 4-digit code, is recommended because it provides greater flexibility for assignment of code numbers in the proper order book sequence for the approximately 500 new items added to the grocery line each year (this use of the 5-card digit code is also recommended for manual methods of ordering).

The proper assignment of commodity card columns groups together those card columns that are machine punched with a reproducer, other columns that are machine punched from a program card on the card punch, and columns punched manually with the card punch.

It was found that the most effective arrangement of cards in the tub files is with the commodity cards next to the divider card. Cards are then pulled from the rear or next to the item divider card. With the batch billing method of invoice preparation and inventory control a system of key punching is substituted for manual pulling of cards from tub files and all subsequent data are inserted into the cards by an electronic calculating punch. Productivity of key punch operators is greater than productivity of card pullers but this advantage must be weighed against the increased machine rental and the need to have orders at least 48 hours before shipment.

By using automatic tabulating equipment, wholesalers, in addition to performing the regular office functions, can (1) analyze commodity sales by individual items or family groups for turnover and gross or retail profit, (2) analyze sales by customer and sales representatives, and (3) obtain stock status summaries on sales and quantity on hand.

IMPROVED METHODS AMONG WHOLESALE FOOD DISTRIBUTORS FOR INVENTORY CONTROL, SALES ACCOUNTING, AND SHIPMENT OF MERCHANDISE

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INTRODUCTION

The office function in the wholesale food distribution business usually includes all of the paper work, including accounting and filing, connected with the purchase and sale of merchandise. This report deals with the paper work necessary in the preparation of sales invoices and methods of performing this work in an efficient manner. Useful byproduct information for inventory control and cost control programs was also obtained. The number of man-hours required to maintain maximum inventory turnover with minimum out of stock, and the billing of retailer orders, selection and shipment of merchandise, and related activities comprise a major cost in wholesale food distribution. Many companies are using automatic tabulating equipment in an attempt to reduce the overall cost of distributing food.

During the study the primary objectives were: (1) To apply the principles of work simplification to routine documents in order to integrate operations for inventory control, sales accounting, and shipment of merchandise; (2) to determine the sales volume necessary to justify use of automatic tabulating equipment rather than manual methods; and (3) to develop an inventory control program and obtain useful information on segments of the business, as a by-product of the billing operation.

Most of this study relates to 20 firms whose office procedures were studied intensively. Six of the 20 firms had annual business volumes ranging from \$2.5 million to \$6 million, 7 of the firms had annual business volumes ranging from \$6 million to \$20 million, and 7 additional firms had annual business volumes of more than \$20 million each.

Manual and automatic tabulating machine systems are discussed separately. Different equipment and methods are used with the 2 basic systems. Recommended work methods and equipment are given for each system.

MANUAL METHODS FOR INVOICING, INVENTORY CONTROL, SALES ANALYSIS, AND WAREHOUSE ORDER SELECTION

Before the use of punched card accounting machines by wholesale food distributors, manual methods were used. Techniques established many years ago are still being used by many wholesale food distributors. Improved manual methods will be discussed in detail.

Preparation of Customer Sales Invoices

Many companies continue to have salesmen hand write the customer invoice with carbon copies. This method requires more than 8 times as many hours as the order book method of invoicing on orders of 100-unit size. With the order book method the customer prepares his order and forwards it to the wholesaler. For purposes of retail store inventory control and merchandising it is necessary that the retailer prepare his own order. ^{1/} Samples of order forms used by some of the companies cooperating in this study are in the appendix. Table 1 shows a summary of the time required to prepare and extend a customer invoice by the handwritten and by the order book summary method.

For a 100-unit order the handwritten method would require 75.55 man-minutes compared with 9.30 man-minutes with the order book invoice method. The time required to write the customer's name, address, and date; to compute the fee; and post the total on the invoice summary would be constant regardless of the number of items ordered (table 1). The time for other elements varies with the number of items ordered. Salesmen required 61 of the 75.55 man-minutes for a 100-unit order with the handwritten invoice method. With the order book invoice method the retailer writes the quantity ordered on the order book as a part of his inventory control and merchandising programs.

Forms Used With Order Book Method of Invoicing

Figure 1 shows the forms used by one firm cooperating in this study for manual order form invoicing. Form A (fig. 1) is a page from the preprinted order book completed by the retailer; it is used for warehouse order assembly, in the office for statement preparation, and as the retailer's invoice.

Form B (fig. 1) is a summary sheet and includes total charges to the retailer for deliveries during the week. All fees are listed in detail.

Form C (fig. 1) is an adding machine tape. The dollar value of each item ordered by the retailer is listed on the adding machine tape in the same sequence as on the order book. The 3 forms are stapled together and given to the retailer when the merchandise is delivered.

^{1/} Kriesberg, Martin. Control of Grocery Inventories at Retail Through Use of Order Books, AMS-237, May 1958.

Table 1.---Time required by wholesaler personnel to prepare, extend, and total a sales invoice by hand-written and order book methods

Operation	Time spent per 100 items ordered <u>1/</u>	
	Individual handwritten invoice	Order book method
	Man-minutes	Man-minutes
Locate items ordered in pricebook:		
(1) Write customer's name, address, date, etc. <u>2/</u>	0.75	0.75
(2) Write commodities ordered and sale prices.....	61.00	<u>3/</u>
Extend and total invoice:		
Individual handwritten invoice		
(1) Multiply units sold by unit sales price and post <u>4/</u>	5.20	
(2) Verification of first calculations.....	2.60	
(3) Invoice totaled <u>5/</u>	5.00	
Order book invoice method		
(1) Order totaled by adding machine or printing calculator: (duplicate tapes).....		3.50
(2) Totals verified by another operator.....		4.00
(3) Totals entered on invoice summary sheet <u>2/</u>05
Fees, if any, are computed (delivery charge and cost plus charges) and added to summary <u>2/</u>	1.00	1.00
(1) One copy of invoice or order book summary retained Total.....	<u>75.55</u>	<u>9.30</u>

1/ Includes 15 percent personal and fatigue allowance.
2/ Constant time per order, irrespective of size of order.
3/ Order is prepared by customer and forwarded to wholesaler with order book method.
4/ With use of a calculating machine.
5/ Time required if adding machine is used. Where calculator is used, cumulative totals can be carried in upper carriage, eliminating need for separate totaling.

FORMA-Order Form

Store No. 10 City Liberty Store
 Floor 1
 Name City Liberty Store
 () Place address
 () Do not substitute

Price subject to change without notice.
 JULY 1, 1957
 Prices subject to change without notice.

AMMONIA
 10A 12.32 oz. 19.32 oz.
 Little Ho-Pop 9.36 oz.
 Little 12/Oz. 3c SPANICH
 Little LIQUID (used in Col. 3)

19/8 oz. Natural Muenster
 12 Cind. Wed. Cheddar Wedges
 34/9 oz. Sharp Wedges
 34/9 oz. Sharp
 10/10 oz. Wedges Longhorn
 17/13 oz. Wedges
 17/13 oz. Wedges

19/21 WELCH'S 14.10 oz.
 34/30 Grapefruit 12.25 oz.
 34/30 Fruit of the Vine 12.20 oz.
 38/21 FZ BRAND
 43/22 Strawberry 12.10 oz.
 47/22 Grapefruit 12.10 oz.
 HOLSTEIN
 55/21 Straw APPLIE BUTTER
 65/21 Straw APPLIE BUTTER
 69/21 Mrs. Brown 12.28 oz.

FORM B Summary Sheet
 July 10, 1957

FORMC Adding Machine Tape

FORMA-Order Form
 Floor 1
 Store No. 10
 Name City Liberty Store
 Price subject to change without notice.
 JULY 1, 1957

TRUCK DRIVERS REPORT
 Net Amount Collected
 \$ 24.39

NET INVOICES
 TOTAL INVOICES
 LESS CREDIT MEMOS
 SUB-TOTAL
 SERVICE CHARGE BUDGET
 F. G. A. ADAPTER
 F. G. A. SHOOPER FOODS
 NET - FROZEN FOODS
 NET CUS.
 NET CUS.
 NET
 NET - EQUIPMENT
 DROP SHIPMENT
 KNOWN UNKNOWN EQUIPMENT
 3.05
 12.36
 210.93 S
 4.22
 10.00
 16.24
 241.39 T

KEY NUMBER OF PIECES DELIVERED
 NUMBER OF PIECES DELIVERED
 Storage and Overseas
 ALL CLAIMS FOR SHORTAGES AND
 DAMAGE AT TIME OF DELIVERY
 Driver's Signature
 Customer's Signature

Figure 1.--Forms used with manual order book method of invoicing.

Type of Adding Machine for Use with Order Book Invoice Method

The standard 10-key adding machine is recommended for use in order book summary rather than the full keyboard adding machine. This recommendation is based on time studies when skilled operators used the machines. Table 2 shows a comparison of the time required to total items with the 2 types of adding machines.

Table 2.--Time required to list items with a 10-key and full keyboard adding machine

Method	: Time per : item	: Items per : man-hour
	: <u>Man-minutes</u> <u>1/</u>	: <u>Number</u>
Listing with full keyboard adding machine.....	: .04842	: 1,239
Listing with 10-key adding machine.....	: .04040	: 1,485
Difference in time required.....	: .00802	: 246

1/ Includes 15 percent personal and fatigue allowance.

As shown in table 2 a saving of .00802 man-minute per item or nearly 20 percent is accomplished with a 10-key adding machine rather than a full keyboard adding machine. On a production per man-hour basis, 1,485 items would be listed with the 10-key adding machine compared with 1,239 items per man-hour with the full keyboard adding machine.

Obtaining Totals on Adding Machine for Order Book Summary

In preparing adding machine tapes, items are listed in the same sequence as in the order book, and when more than one unit of an item is ordered the sales price is repeated for each unit.

Verification of Order Book Totals

When order books received from retailers contain many pages, and the order book invoice method is used, addition errors can be extensive. Audit checks of the accuracy of the clerical work is essential to eliminate such errors. When one company began checking the addition by running a second tape with subtotals for each page, a number of errors were found over a period of 8 weeks (table 3).

When the volume of retailer orders is great, it is recommended that adding machine subtotals be used on the adding machine tape at predetermined sections of the order book (at end of each page, every 10th page, etc.). This method results in a rapid check of any differences between the first and second tapes. By comparing subtotals on each tape the section of the order book where the error was made can be located, eliminating the need for checking each item on the 2 tapes to reconcile differences.

Table 3.--Number of errors and dollar value found by running a separate adding machine tape with subtotals on each page

Company branch	:	Number of errors	:	Dollar value of errors
A	:	27	:	\$227.08
B	:	96	:	151.03
C	:	75	:	183.01
D	:	25	:	92.26
E	:	13	:	55.49
F	:	16	:	79.68
Total	:	252	:	\$788.55

Inventory Control and Turnover Analysis With Manual Methods

For inventory control and material accounting with a manual system, data should be recorded onto perpetual inventory stock cards. A relatively small number of wholesale food distributors with manual methods of grocery billing are utilizing inventory control and turnover analysis procedures. Inventory control is recommended for the following reasons: (1) To provide control of inventory balances for reconciling against actual stocks on hand; (2) to enable the accounting department to "cost" the items sold in order to compute gross profits for profit and loss accounting; (3) to provide a current historical record for the buyers as to movement of the various items for use in determining quantities to be ordered; and (4) to discourage theft of merchandise and to disclose the extent of shortages in the event of pilferage.

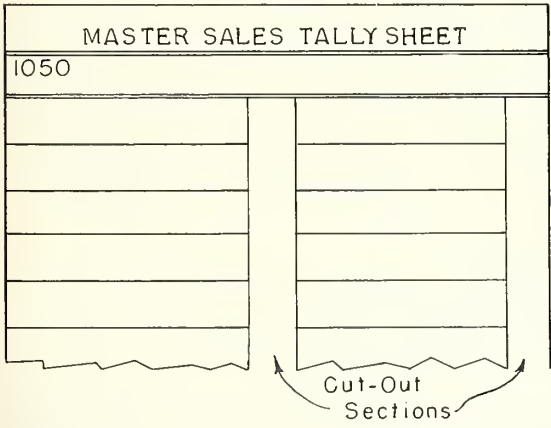
With manual methods of invoicing sales are recorded by item on a tally sheet for inventory control and turnover analysis. The tally sheet can be a form stapled to each column page of an office copy of the order book (fig. 2) or "cut-out" sheets (fig. 3) placed over each page of the customer's order book can be used.

The separate tally sheets (fig. 2) stapled to each column page are recommended because:

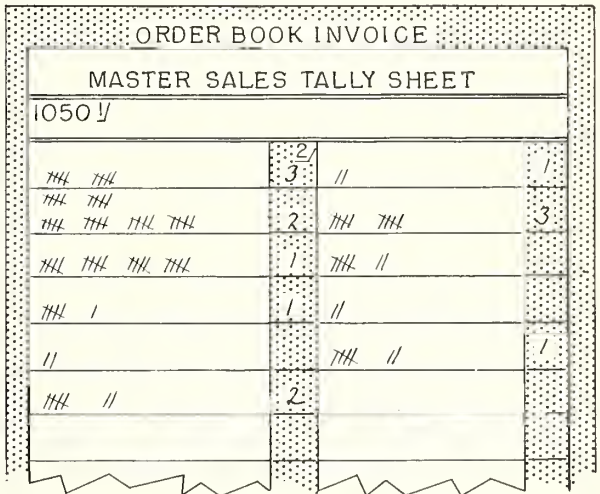
- (1) The tally sheet provides a greater area for posting and the column spacings in multiples of 5 (spacings of 25, 50, 75, etc.) simplify cross totaling.
- (2) Column divisions (heavier lines at 25, 50, 75, etc.) permit the clerk to cross total on a more rapid basis than is possible with a cut-out sheet.
- (3) The order book pages stapled to the tally sheets provide a complete description of each item, minimizing errors in comparison and subsequent posting operations.

CK	QUAN.		25	50	125	150
		PESTA PICKLES	///			
/	12/16oz	7 Sweet -Chins	///	///	///	///
	12/15oz	9 Cucumber Rings	///	///	///	///
2	24/16oz	10H.S. Plain Dills				
	12/32oz	11H.S. Plain Dills				
/	12/16oz	13H.S. Kosher Dill	///	///		
	12/32oz	14Dills-Kosher HS				
	12/32oz	18Dills - Polish	///	///	///	
	12/32oz	20Dills-Pony HS				
/	12/28oz	23Dill Kos. Stix				
	12/16oz	30Hamburger Slices	///			
	12/16oz	32Sl. Sweet Icicle				
/	12/16oz	45Onion Rings				
	12/16oz	52Sweet Relish				
	12/16oz	57Ex Swt Dill Stix	///	///	///	///
5	24/8oz	60Whole Sweets	///			
	12/16oz	61Sweets-Whole				
	12/32oz	63Sweets-Whole				
	12/32oz	65Wh. Kosher Tomatos	///	///	///	///
3	12/32oz	73Hot Ban. Peppers	///			
	12/28oz	75Hot Mix Pickles	///			
	24/16oz	79Swt Ban. Strips				
1	12/16oz	10 HS Plain Dills				

Figure 2.--Sample of tally sheet stapled to order book pages. This is the recommended procedure for posting a customer's order from the order book to the tally sheet. Note that postings of "5" and multiples are used to accelerate cross totaling.



CUT-OUT FORM BEFORE PLACING IT OVER CUSTOMER'S ORDER BOOK



CUT-OUT FORM PLACED OVER PAGE OF CUSTOMER'S ORDER BOOK

Figure 3.--Cut-out type of tally sheet.

Figure 3 shows the cut-out type of tally sheet. This form is made of heavy, rigid paper exactly duplicating the order book except that the item description is omitted and the quantity-ordered column is cut out entirely.

After the retailer order has been assembled in the warehouse and the invoice summary prepared, the order is posted page by page to the tally sheet attached to an office copy of the order book. At the end of the week the tally sheets are cross totaled and the total quantity sold during the week is posted in a combination buyer's record and inventory control card (fig. 4).

VENDORS 1. Pacific Canning Co.					BROKER OR SALESMAN 1. James Doe					19 57					SHIP CASE 24/8z		REG. PUR. BASIS		NEW PACK															
2.					2.					ADV. RATE		STG. LOC.		MIN. ORDER		SALES GUAR.																		
										PERF. REQ.		CONTRACT BAL.		WHSE. SPACE		PRICE GUAR.																		
DATE	REC'D	SOLD	TOTAL SALES	BAL.	DATE	REC'D	SOLD	TOTAL SALES	BAL.	DATE	REC'D	SOLD	TOTAL SALES	BAL.	DATE	REC'D	SOLD	TOTAL SALES	BAL.															
1/1	INVENTORY			10																														
1/8	10	3	3	17																														
1/15		5	8	12																														
PROM ALLOW					1. COST 225					2. COST					LOCAL DEL. OR PICK-UP RATE		MKT.		STORE CASE		STORE		STORE S.R.		INST.		INST		INST					
CASH DIS 1-1/2					FRT. 13					DATE ENT.					STG TO DATE		TOT. COST																	
ORDERS					ITEM					BRAND					SIZE					CODE NUMBER					FRT. RATE					CASE WT.				
E					Peas & Carrots					Good Brand					24/8z					230-82										17#				

1/ Represents quantities received in warehouse. These quantities are posted daily from receiving reports.

2/ Represents quantities sold for the entire week. These are the quantities obtained from the tally sheets.

3/ Cumulative totals of sales to date.

4/ Represents quantity of merchandise on hand. This balance should equal the actual quantity of merchandise stored in the warehouse.

Figure 4.--Combination buyer's record and inventory card. These cards are usually maintained in an index type of file with the cards placed in the same order as the items are listed in the order book.

Warehouse Order Assembly With Preprinted Order Books

Order assembly in the warehouse involves bringing together all merchandise ordered by the customer from warehouse stocks. When the preprinted order book

is used merchandise is usually stored in the warehouse in the same sequence as it is listed in the order book. ^{2/} Order books are usually divided by warehouse sections or when multistory warehouses are used they are divided by floors and used by order fillers to assemble the items for the area.

The procedure followed with the order book in the warehouse is as follows: A clerk punches the store number into all pages of the order book and writes in items ordered separately; the order is separated by floors or areas; and the order is listed on a preprinted load sheet. The order filler checks each item as it is selected; after the section of the order is assembled the order filler counts the number of cases. The assembled orders are then brought to the shipping dock where the shipping clerk lines up the order for loading and accumulates the sections of the order book. After the total order reaches the shipping dock the order book is taken to the office clerk who totals the number of cases assembled, totals the dollar value of the order, and records the cases on the load sheet.

In totaling the order it is recommended that the case count be added simultaneously with the dollar value of the order as shown in the following tabulation. The case count is used by the retailer and delivery truck driver for checking the delivery.

<u>Case</u> <u>Count</u>	<u>Dollar</u> <u>Value</u>
260,164.50	S
10,003.90	
10,003.29	
10,005.73	
10,001.49	
10,000.80	
10,000.80	
10,000.78	
10,000.80	
10,000.80	
350,182.89	T

In one instance where the wholesale grocer was separating the order book into various warehouse sections for selecting, approximately 6 to 8 hours daily were spent handwriting the customer's account number on each page of the order book to retain control of the order book. This operation was reduced to approximately an hour weekly by using a small, hand-operated, desk model, perforating machine and punching the customer's number into all pages of the order book in one operation.

^{2/} In order assembly, with a preprinted order book, merchandise is stored and selected in the warehouse in the same sequence as on the order book. Labor productivity in this case is 25 percent greater than with handwritten invoices where items are not listed in sequence. See Marketing Research Report No. 94, "Methods of Increasing Productivity in Modern Grocery Warehouses," p. 16.

Preparation of Out-of-Stock Report with Manual Methods

The out-of-stock report is considered one of the more essential management reports. These reports are prepared for daily submission to the buyers to determine the extent of business lost due to the fact that merchandise is not available when ordered; to notify the buyer that certain items are out and must be ordered; and to remind buyers of the possibility of substituting like items wherever practicable. The industry experience indicates that the dollar value of "lost" sales as disclosed by their "out-of-stock" reports represents from 1 percent to 3 percent of the wholesaler's sales volume.

The out-of-stock report is prepared with use of the order book invoice method as follows: (1) Order filler circles the items ordered but out of stock; (2) the office clerk tallies items out of stock on a worksheet; (3) at the end of the day the tally sheet is cross-totaled and extended by sales price to arrive at the total value of lost sales; and (4) the out-of-stock report is submitted daily to buyers and other executives in the company.

AUTOMATIC TABULATING EQUIPMENT FOR INVOICING, INVENTORY CONTROL, SALES ACCOUNTING, AND SHIPMENT OF MERCHANDISE

Automatic tabulating equipment is being used by a greater proportion of the wholesale food distributors each year in an attempt to reduce office clerical costs.

Types of Automatic Tabulating Equipment Used

Rental or purchase costs, operating characteristics and technical requirements of the machines described in the study are available from manufacturers of tabulating equipment.

The card punch machine is used for recording alphabetic, numerical, and special character data into tabulating machine cards (fig. 5). The data are punched into the cards by manual operation of a keyboard or by program reading. In program reading a program card is inserted into the machine to reproduce identical data into cards.

Accounting machines are used to prepare customer invoices, various accounting reports (including sales analysis by salesmen, customer and commodity class) out-of-stock reports, list of receivings, tons-per-man-hour reports, and similar types of reports (fig. 6). Some of these accounting reports are discussed in following sections of this report.

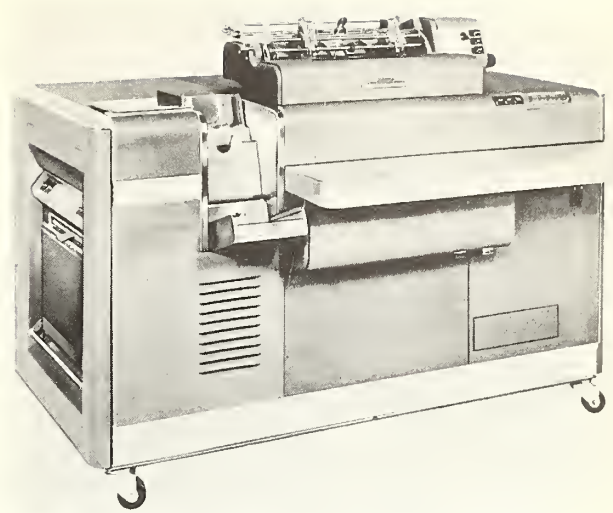
Data punched into cards can be read, added, subtracted, compared or selected at the rate of 80 to 150 cards per minute by the accounting machine. The machine will print detail data on reports, records, or preprinted forms at the rate of 80 to 100 lines per minute.

The reproducer or document-originating machine is designed to duplicate mechanically repetitive data into blank cards with use of a master card at the rate of 100 cards per minute. The reproducer is customarily used with a



Figure 5.--A card punch used for recording alphabetic, numerical, and special character data into tabulating machine cards.

BN-6173



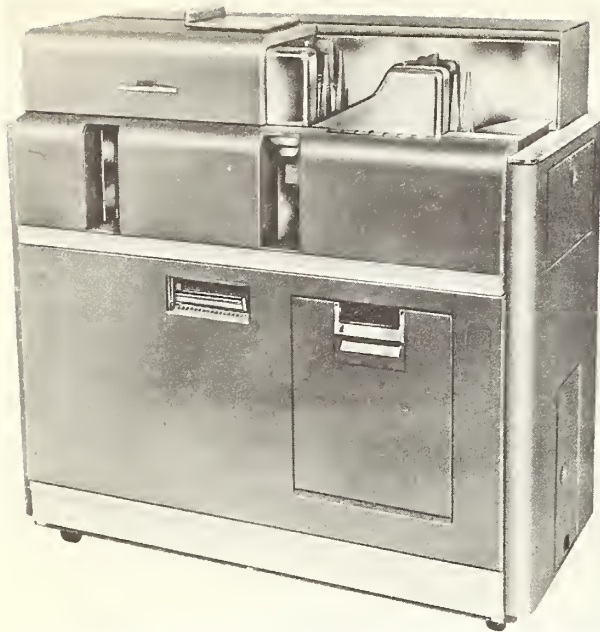
BN-6174

Figure 6.--An automatic accounting machine used to prepare reports and records from punched cards; it operates automatically in feeding cards and printing results.

printing unit for end printing up to 8 digits of information on each card (fig. 7). The card punch (fig. 5) will also reproduce cards although the card punch will not end print. The reproducer is used by wholesale food distributors to reproduce quantities of customer name and address cards; to reproduce commodity cards in numbers equal to the units received; and to reproduce commodity cards incorporating corrections due to slot, cost price or resale price changes.

Sorters are used to sort punched cards into any desired numerical or alphabetic sequence (fig. 8). The sorting or selection of punched cards is performed at the rate of 450 to 650 cards per minute, depending on the model machine used. Wholesale food distributors used the sorter principally to sort commodity cards into warehouse slot (location) sequence in the billing operation and to sort cards into various sequences for sales or customer analysis.

The summary punch (fig. 9) is connected to the accounting machine and is used by wholesale food distributors: (1) To punch sales by customer into blank cards during the billing operation; (2) to summary balance forward various reports such as the sales report and out-of-stock report; and (3) to summary balance forward sales by commodity classification. To summary balance forward means to punch totals, accumulated by the accounting machine, into blank cards which will be used to prepare current and subsequent reports. These machines are used principally by wholesale food distributors having a large sales volume as smaller distributors usually obtain summary data with card punch machines.



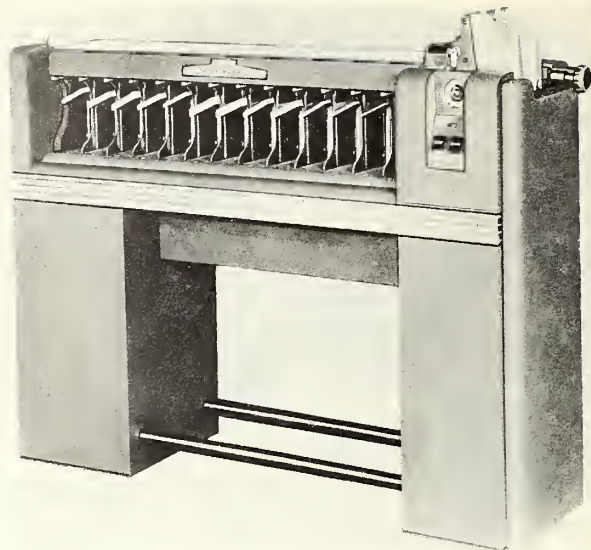
BN-6175

Figure 7.--Reproducer used to duplicate mechanically repetitive data into empty cards from a master card.

Each of the machines described in this section contains modifications or special features designed primarily for the specific needs of each company. Improvements are constantly being made in the various types of automatic tabulating equipment. The greatest potential in terms of future cost savings lies in elimination of the tab-card pulling and in higher speed printing of invoices and reports. Great progress has been made in substituting key-punching, mark sensing or magnetic tape processes for input data on customer's orders and it is expected that further improvements will be made.

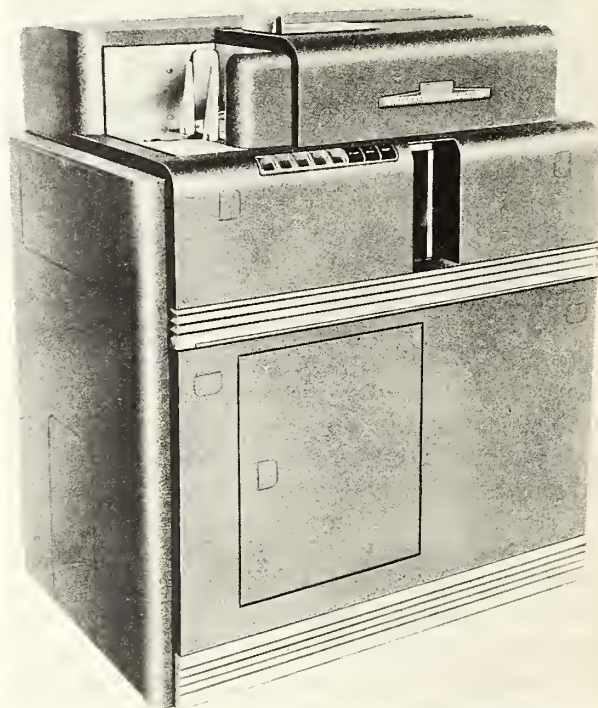
Assignment of Code Numbers
to Commodities

The assignment of code numbers to the commodities stocked in the warehouse has an important influence on all subsequent procedures in card pulling, key-punching, and machine



BN-6176

Figure 8.--A sorter used to sort punched cards into desired numerical or alphabetic sequence.



BN-6177

Figure 9.--A summary punch is used to punch summary data into cards from data processed by the accounting machine.

processing. Improper designation of "family" codes and individual item coding on the initial coding assignment has led to subsequent recoding at many wholesalers requiring additional costs ranging from several hundred to several thousand dollars.

Wholesale food distributors indicate that approximately 500 new items are added annually and 250 are discontinued. In addition to these changes there is an average of 65 to 75 items on special promotions each week. Proper assignment of commodity sequence code numbers permitting logical grouping is necessary. The 5-digit commodity code is more satisfactory than the 4-digit code for the following reasons: (1) There is a need for code numbers whenever manufacturers have a special promotion on a regular item for a short period of time. To avoid confusion in ordering items and in warehouse selection it is recommended that temporary code numbers be assigned such special promotion items; and (2) the use of a 5-digit code provides for skip spacing throughout the code numbers so that items on special promotion and new items can be listed within the desired category conforming to the sequence required to identify manufacturer, size, and pack. As shown in table 4 if the manufacturer for Church Grape Juice desires to add a grape juice in the 12/36 oz. size, the assignment of code number 10-162 will assure insertion of the item in the proper sequence in the order book as well as in the tub files for card pulling.

Table 4.--The recommended method of assigning code numbers to commodities

Item description	Commodity code number	
	Family code ^{1/}	Item code
12/24 oz., Church Grape Juice.....	10	160
12/46 oz., Church Grape Juice.....	10	164
48/ 4 oz., Welsh Grape Juice.....	10	171
24/12 oz., Welsh Grape Juice.....	10	175
12/24 oz., Welsh Grape Juice.....	10	179

^{1/} Family code 10 represents juices and beverages.

The recommended method for assigning code numbers as shown in table 4 includes the use of a 5-digit code with multiples of 2 between items and different pack sizes and groups of at least 5 between product brands. There is also a spread of at least 5 units between commodity subclassifications.

With the recommended method of assigning code numbers to commodities (as shown in table 4) the first 2 digits of the 5-digit code is the family class code. A family class code would group together a related group of items such as baby foods, cereals, and canned fruit. Following is a partial list of family codes used by 2 firms cooperating in this study.

The 3 remaining digits in the recommended method of coding is the item code used to identify various items within the family class.

Firm A	:	Firm B
Family class code and item	:	Family class code and item
00 Frozen foods	:	00 Store supplies
02 Frozen foods	:	03 Canned juices
03	:	05 Canned fruits
04 Produce	:	07 Small canned items
05	:	09 Canned vegetables
06 Kraft foods	:	11 Glass pack
07	:	13 Ready-to-eat
08 Oleomargarine	:	15 Canned meats
09	:	17 Canned fish and seafood
10 Juices and beverages	:	19 Baking supplies
11 Canned fruits	:	21 Shortening and oil
12 Party foods	:	23 Canning supplies
13	:	25 Milk
14 Dietetic foods	:	27 Flour, flour mixes
15 Canned vegetables	:	29 Syrups, molasses
16 Canned meat	:	31 Extracts and spices
	:	

The cost of changing from a 4-digit code to a 5-digit commodity code in one firm is shown in table 5. Costs shown in table 5 are direct costs, additional indirect costs incurred would include delays in shipping merchandise due to the change and the newness of the system.

Table 5.--Costs incurred in changing from a 4-digit to a 5-digit commodity code in a company with a \$15 million annual business volume

Expense item	:	Card	:Machine:	Clerical:	Total
	:	cost	cost	cost	:
	:	:Dollars:	Dollars:	Dollars:	Dollars:
Key punch master commodity cards with new code.....	:	9.40	5.38	17.63	32.41
Gang punch data from old master deck to new deck.....	:	--	2.49	5.07	7.56
Replace 200,000 commodity cards in tubs.....	:	251.40	41.43	51.70	344.53
Clerical work at tub files such as counting, pulling, and replacing cards and changing records.....	:	--	--	295.68	295.68
Supervisory cost.....	:	--	--	200.00	200.00
Total cost.....	:	260.80	49.30	570.08	880.18

Assignment of Code Numbers to Customers

The proper assignment of initial code numbers to customers for machine identification is necessary in obtaining sales analysis and other reports. The following principles are recommended for customer coding: (1) Using the

name appearing on the outside of the store as the first name card in order that the truck driver can identify the store; (2) maintaining a register book for recording each customer's name and address; and (3) numbering each double page of the register record numerically to represent the alphabet prefix as follows:

<u>Page Number</u>	<u>Alphabetic Designation</u>
1	A
2	B
3	C
-	-
10	J
11	K
-	-
-	-
25	Y
26	Z

Each page is numbered from 00 to 99 in the customer register book. Thus it is possible to have as many as 100 customer names in any one letter of the alphabet. Each customer is assigned a code number in the register book based on the alphabetic sequence as shown in figure 10.

		<u>1000</u> DIGIT		<u>A</u> ALPHABET		<u>DATE</u>	
	STORE NAME	ADDRESS	CITY	ADDED	DSCTD.		
01	Aaron, Earl C.	1118 No. 3rd St.	Elm Grove	2/12/52			
02							
03							
04							
05	Abbot, John E.	212 Main Street	Beaver Dam	3/20/56			
06							

Figure 10.--A typical page from a customer register book showing the assignment of customer code.

The code for Mr. Earl C. Aaron would be 1001 and the code for Mr. John E. Abbot would be 1005. The same sequence of listing is used throughout the register book.

Assignment of Code Numbers to Field Representatives

Coding by field or sales representatives is desirable in preparing sales analysis of accounts serviced by each representative. Customers are usually assigned to field representatives on a territorial basis and consequently sales reports permit management review of the sales results by individual representatives as well as sales obtained in the various districts.

The assignment of a code number to field or sales representatives requires only one card column if less than 10 representatives are employed. Two card columns would provide codes for 99 field representatives. Coding for field representatives is done in alphabetic sequence and should precede the digits assigned to the customer. This procedure then requires a change only in the field representative's code number whenever accounts or territories are re-assigned.

Coding of the customer and sales representative in alphabetic sequence makes it practicable to issue sales reports by customer and sales representatives.

Design and Layout of Tabulating Cards

The preparation of invoices for sales to retail store owners utilizes 2 basic types of cards. The first card type is used for printing data such as the customer name, street address, city, state, and other instructions concerning delivery and method of payment. The second card type is used to indicate quantity sold, commodity code number, warehouse location number, commodity description, case weight, size, pack, unit sales price to customer, total sales price for each item, suggested retail selling price, total invoice cost and total weight of shipment. In some instances the wholesaler also lists the purchase price of items sold.

Customer name and address cards: For reasons of economy, the majority of companies included in this study used the regular commodity card for punching of data for the accounting machines to imprint customer's name and address on the invoice. With a few exceptions among the companies studied, cards were not "interpreted" or the customer's name and address was not printed on the tabulating cards. The cards are customarily reproduced from a master card (originated by key-punching) with the reproducing machine with the customer's code number imprinted on one end.

To reduce the possibility of error in pulling customer name and address cards, different colored cards are used to denote the customer section of invoice printing. The card puller can visually check the card colors to make sure a complete set has been obtained and check the code number appearing on these cards with the code number appearing on the customer's order book. Figure 11 illustrates a typical set of customer name and address cards.

Upon completion of the invoicing operation, the name and address cards are separated from the commodity cards and returned to the files for use when the customer places another order.

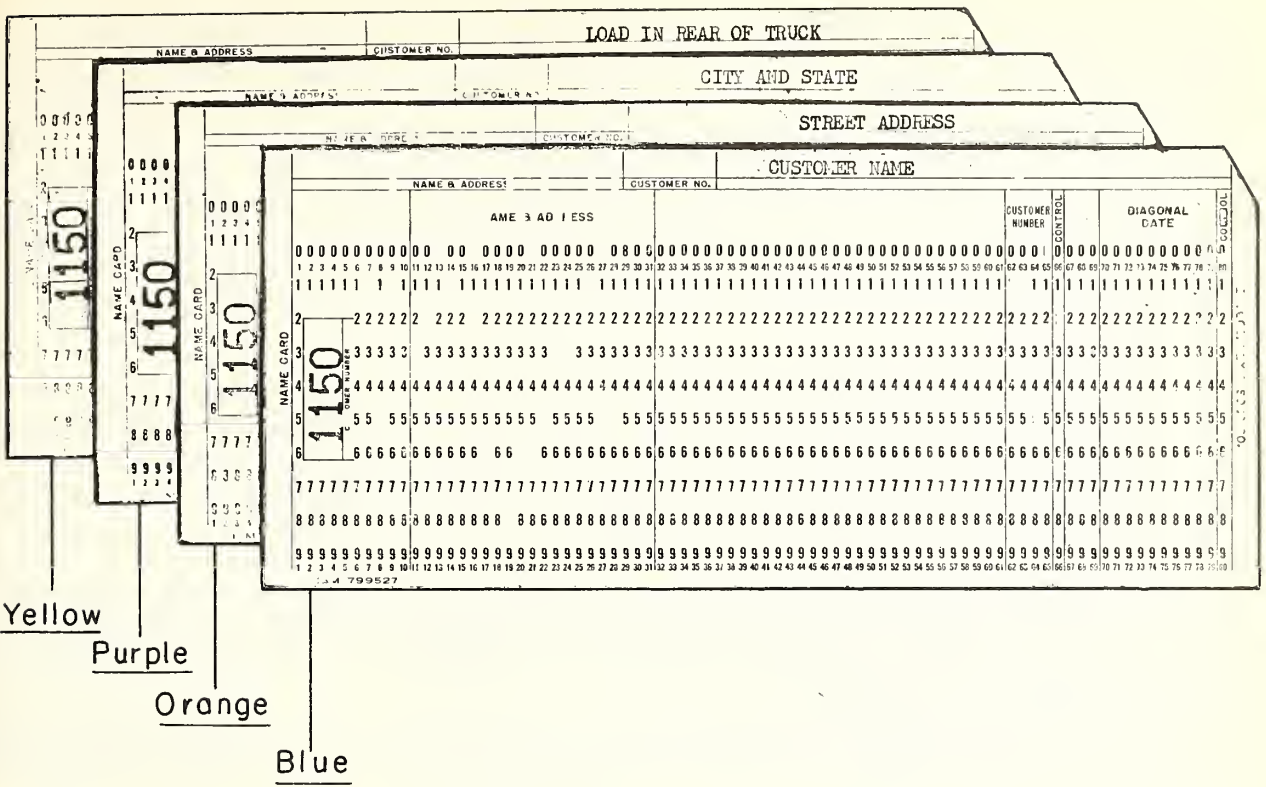


Figure 11.--A complete set of customer name and address cards.

The assignment of card columns for the cards shown in figure 11 are shown in table 6.

Table 6.--Assignment of card columns for customer name and address cards

Card Columns:	No. of digits:	Explanation
1 and 2	2	: Field representative's code assigned to the account
3 and 4	2	: Store number of customer
11 - 31	21	: Customer's name
37 - 39	3	: Special indication to denote that cases ordered are to be price marked by the warehouse order selector
40 - 61		: Not used
62 - 65	4	: Customer number
66	1	: Special punch to control customer heading card (blue)
67	1	: X punch to control customer address card (orange)
68	1	: X punch to control customer city and state address card
70 - 79	10	: Diagonal date punch
80	1	: X punch for heading control

Some of the card column assignments shown in table 6 demonstrate the mechanical operations designed to simplify certain machine operations. The special "X" punching of card columns 66, 67, and 68 is done to separate the customer's name, street address, and city cards from the regular commodity cards for a faster sort identification through the sorter than would be possible without the special punching. Assignment of these columns accelerates the separation of name and address cards from all other cards on completion of the billing operation; sorting name and address cards together in proper sequence to put cards in proper sequence for return to tub files; separating each type of name and address cards into various categories for reproduction on the reproducing machine.

The diagonal date punching of card columns 70 - 79 (table 6) serves to impulse a semifixed control panel device attached to the regular control panel actuating the accounting machine. This attachment, popularly known as the "piggyback plugboard," enables the machine to imprint the billing date on each invoice page without use of trailer cards.

This device enables daily changing of the wiring controls on a simplified basis without removing the panel cover and changing the regular control panel. The device can be purchased for \$40.00 and is recommended for all wholesalers using this type of equipment.

Several wholesale food distributors are printing card column headings for both the commodity columns and also customer columns on all cards used (fig. 12).

3220		5		GROCERY SERVICE		0100100-		5 03						
SLOT	CUSTOMER CODE	COMMODITY CODE	NO. OF UNITS	TYPE OF UNITS	PACK & SIZE		WHOLESALE			RETAIL			EEO. TAX	
					CONTENTS	SYMBOL	DESCRIPTION	UNIT PRICE	SALES AMOUNT	COST	SUG. RET. PR. UNIT	SUG. RET. PR. AMOUNT		PER. UNIT
763	0000	0060	0000	0000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000	00000000
	22	2222	2222	2222	22222222	22222222	22222222	22222222	22222222	22222222	22222222	22222222	22222222	22222222
	3	3333	3333	3333	33333333	33333333	33333333	33333333	33333333	33333333	33333333	33333333	33333333	33333333
	4	4444	4444	4444	44444444	44444444	44444444	44444444	44444444	44444444	44444444	44444444	44444444	44444444
	5	5555	5555	5555	55555555	55555555	55555555	55555555	55555555	55555555	55555555	55555555	55555555	55555555
	6	6666	6666	6666	66666666	66666666	66666666	66666666	66666666	66666666	66666666	66666666	66666666	66666666
	DATE	CUST. CODE	NAME AND ADDRESS											
	1111	1111	1111	1111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111	11111111
	8888	8888	8888	8888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888
	9999	9999	9999	9999	99999999	99999999	99999999	99999999	99999999	99999999	99999999	99999999	99999999	99999999

Figure 12.--A tabulating card with card columns labeled.

In those instances where specific data (invoice number or date, for example) is not punched into the card, the customer name and address cards can be used many times. Card usage averages 4 to 6 months, occasionally longer, before wear and tear requires replacement. One company with over 2,000 customer

orders weekly substitutes special card stock available from manufacturers that will last much longer than regular cards. These cards generally cost about 25 cents per 1,000 cards more than the usual stock grades. However, the company reports these cards can be used for approximately 6 months as compared with 2 months use with regular cards resulting in an annual saving of approximately \$175. The use of this special card stock is recommended in those instances where there is a large number of customers serviced and name and address cards are subjected to more than average usage.

Several wholesale food distributors are machine imprinting instructions on the invoice by pulling "trailer" cards with the name and address cards. For example in figure 11, the card states "load in rear of truck." These instructions are designed to insure proper credit follow-up and avoid delays in delivery. Information printed on the customer invoice with trailer cards by some wholesale food distributors is shown below.

Machine imprint on invoice :	Reason for imprint
"NOT OPEN BEFORE 8:00 A.M."	: Notice as to delivery time
"WILL CALL"	: Customer will pick up order at warehouse
"CALL ORDER - RUSH"	: Customer will pick up order on rush basis
"SHIP ADVERTISING"	: Include weekly advertising material with order
"SHIP OPEN ACCOUNT"	: Customer sold on a credit basis
"ROUTE 3, ZONE 4"	: Routing notice for delivery schedule and freight charge zone
"NCT"	: No common carrier available - if order is late, cancel it
"CREDIT CHECK"	: Approval is required by credit manager before order is assembled and shipped
"DO NOT PARK IN DRIVEWAY"	: Delivery instruction
"COD"	: Driver is to collect invoice amount on delivery
"SHIP TO ___ BILL TO ___"	: Instructions to send invoice to central office where bills from multiple stores are paid
"LOAD IN REAR OF TRUCK"	: Warehouse instruction for loading delivery truck

Design of the commodity card: The arrangement of the commodity card column assignments has a definite influence on the productivity and accuracy of personnel in the tabulating department. Card columns should be assigned with information punched into the card in the same sequence as it appears on the source document; and all like punching operations should be grouped together to simplify wiring and eliminate interspersed skipping on the keypunch. Manually punched fields should not be interspersed among duplicated, gang punched, reproduced or summary punched fields.

Table 7 shows the assignment of card columns used by 2 companies cooperating in this study. The layout used by Company C is the recommended card column arrangement.

The card design used by Company C is recommended because machine reproduced columns, program punched columns and manual punched columns are grouped together. The card used by Company D requires "skip" punching or changing from manual punching to program and then back to manual.

Table 7.--Automatic tabulating machine card column assignments used by 2 cooperating firms

Company C - Recommended card design		:	Company D - Improper card design	
Card : columns:	Method of punching data into cards	:	Card : columns:	Method of punching data into cards
:	:	:	:	:
1 - 12:	Reproducing machine punching	:	1 - 4:	Reproducing machine punching
13 - 57:	Card punch - program	:	5 - 20:	Card punch - manual
58 - 80:	Card punch - manual	:	21 - 60:	Card punch - program
:	:	:	61 - 80:	Card punch - manual
:	:	:	:	:

A series of time studies was made with use of the 2 types of cards on inserting identical data on price changes. The data were summarized as shown in table 8 on the manual key-punch processing time, excluding the machine reproducing time.

Table 8.--Time required to key punch price changes into automatic tabulating machine cards

Card design	:	Average time to change card <u>1/</u>	:	Time to change 250 cards <u>2/</u>
	:	<u>Man-minutes</u>	:	<u>Man-minutes</u>
Improper card design (Company D).....:	:	0.62	:	155.00
Recommended card design (Company C)....:	:	0.39	:	97.50
Differential due to card design.....:	:	0.23	:	57.50
:	:	:	:	:

1/ Includes 15 percent personal and fatigue allowance.

2/ Approximately 250 grocery price changes are made weekly by wholesale food distributors.

As shown in table 8, with use of the recommended card design less than 63 percent as much manual key punching time is required. The chances of making errors are also reduced when all data requiring key punching are grouped together.

The type of punching required to originate the master or initial commodity card is shown on the next page. It is always desirable to consider card visibility in the card design because of card viewing while in the card punch machines. Fields to be duplicated should be grouped together and placed at the left end of the card. Manual punched data should be placed on the right side of the card.

Type of punching

Information punched into card

Variable punching
 (card punch on program basis)
 (card punch on manual basis)

Manual punching 1/
 (card punch on manual basis)

Program punching 1/
 (card punch on program basis)

Program punching, if fixed slots are used in warehouse

Manual punching, if floating slots are used in warehouse

Advertising allowance

Unit cost

Suggested retail selling price

Customer selling price

Quality

Package and size

Description of commodity

Commodity code

1/ Manual punching consists of depressing a key to punch the corresponding numeric digit or alphabetic letter into the card. Program punching is performed by inserting a program card punched with certain repetitive data on the program drum in the card punch. This program card controls mechanically automatic reproduction punching into corresponding columns of the cards being punched.

In grocery inventory billing, approximately 35 to 45 percent of the 80 card columns available will contain repetitive data which changes seldom, if ever (table 9). Data for each commodity item remains identical in all subsequent operations whenever the cards are reproduced.

Table 9.--Repetitive data usually included on commodity cards

Repetitive data	Number of card columns customarily used	
	Minimum	Maximum
Commodity code.....	4	5 digits
Quantity.....	1	3
Pack and size.....	4	6
Description of item.....	20	22
Total card columns.....	29	36

Slot numbers (warehouse location) may be repetitive data depending on the method of warehousing used. When fixed slots are used, changes occur only at the time of an addition to the line and discontinuance or relocation of the merchandise due to velocity or season. When the floating slot system is used each receiving will have a different slot number.

Proper layout of the commodity card where the foregoing principles have been observed results in greater productivity in reproducing operations particularly in manual key-punching. Figures 13 and 14 show use of the suggested principles in card column placement.

Several wholesale food distributors who use the "floating slot" system of warehousing use a card similar to the one shown in figure 14: With use of this system, tab cards are prepunched with the commodity code number and item

REPRODUCED BY GANG PUNCHING ON REPRODUCING MACHINE FOLLOWING MASTER CARD

MANUALLY PUNCHED ON CARD PUNCH

MACHINE PUNCHED ON CARD PUNCH WITH PROGRAM CARD

MARK SENSING FIELD USED BY WAREHOUSE TO INDICATE SLOT LOCATION

1-6		7-38										39-69										70-80	
CUSTOMER NUMBER	SALESMAN NUMBER	WAREHOUSE SPACE			CASE PRICE			COST PLUS	COST	% PROFIT	SUGGESTED RETAIL PRICE		TAX	WEIGHT	COMMODITY CLASS	CODE NUMBER	DESCRIPTION	MARK SENSING FIELD					
		INST	REGULAR	CASE	UNIT	CASE	NO CS				YES CS												
000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	000	0	0				
111	111	111	111	111	111	111	111	111	111	111	111	111	111	111	111	111	111	1	1				
222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	222	2	2				
333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	333	3	3				
444	444	444	444	444	444	444	444	444	444	444	444	444	444	444	444	444	444	4	4				
555	555	555	555	555	555	555	555	555	555	555	555	555	555	555	555	555	555	5	5				
666	666	666	666	666	666	666	666	666	666	666	666	666	666	666	666	666	666	6	6				
777	777	777	777	777	777	777	777	777	777	777	777	777	777	777	777	777	777	7	7				
888	888	888	888	888	888	888	888	888	888	888	888	888	888	888	888	888	888	8	8				
999	999	999	999	999	999	999	999	999	999	999	999	999	999	999	999	999	999	9	9				

Figure 14.--Card column assignment on a master commodity card with a mark sensing field for warehouse location.

punched, the quantity punched is entered in the "punched" column and any balance remaining is posted in the "unpunched" column. In those instances where there is any unpunched quantity, the setup card should be placed in tub file as a signal that there is an additional quantity available.

There are 2 basic methods used in the tabulating departments of wholesale food distributors for pulling cards from the tub files. These methods are the low-to-high and the high-to-low. The setup cards are mandatory for those companies where cards are pulled under the low-to-high method. With this method a record must be kept of the last serial number assigned the commodity cards.

With the low-to-high method, the lowest numbered cards are pulled from the files first in ascending order with the lowest serial numbers to the rear. As orders are filled, cards at the rear are pulled first from the file; and those are the cards with the lowest serial numbers. Cards are consecutively numbered from the beginning of the year starting with "one" and each subsequent receiving is numbered serially following the last highest serial number for the preceding receiving.

With the high-to-low method, cards are pulled in descending order with the highest serial numbers to the rear. As orders are filled, cards at the rear are pulled first from the file and those are the cards with the highest serial numbers. Each quantity received is consecutively numbered beginning with "one" and no effort is made to consecutively number all quantities received during the year.

There are now very few wholesale food distributors using the low-to-high method of numbering and pulling commodity cards. Some of the disadvantages of the low-to-high method are that a "bookkeeping" chore is required in recording onto a stock control card the consecutive serial numbers from the first of the year. The recording is done by pencil posting with manual additions which increases the possibility of error; there is continual delay in the initial setup of the reproducing machines as cards are prepared. The machine under the low-to-high method must always be set at the previous high serial number of the last quantity plus one.

Under the high-to-low method, the reproducing machine is always set on number "one" and the necessary number of cards to be reproduced is set. Tub card counts (for buyer's stock records and inventory comparisons) with the high-to-low method require only the noting of the serial number on the last card whereas with the low-to-high method tub card counts require the noting of the high and low numbers, subtraction between these numbers and addition of one to arrive at the quantity of cards in the tub.

When setup cards are used in the tub files, the cards are used as a combination tub master card and punch record card. In other instances, the card is a permanent record kept for the entire year to indicate the sales of the item. Most companies maintain a combination tub master and punch card, similar to those shown in figure 15 on the premise that the buyer's stock card contains similar data.

The primary uses of the setup cards are to notify the reproducing machine operator of the quantity of cards to be prepared, to control balances of unpunched cards, as a price change record and to record any changes in item description. One company periodically pulls all of the stock control cards, totals quantities received for the quarter, punches cards as to quantity and related data, and lists on the accounting machine the turnover by commodity for use as a guide to the buyers in purchasing new supplies.

"Out" and "Minimum" Signal Cards

Only limited use was made of "out" or "minimum" signal cards among the companies studied. These cards, shown in figure 16, are sent to the buying department by tabulating department personnel whenever a reorder or out condition is reached on a commodity. Minimum order signals were not used extensively for the following reasons: (1) It is difficult to establish a reorder point on many items due to the seasonal nature of sales; (2) there is a constant change in demand and movement of individual commodity items; and (3) the use of minimum order signals in the tub files would increase the space required in the tubs.

The use of minimum reorder signal cards is recommended under certain conditions for a limited number of selected items--for example, when certain items are in short supply or a heavy demand exists which must be met, and when delivery from the supplier requires in excess of 5 days.

PERMANENT
STOCK CONTROL
CARD

S44 STOCK CONTROL CARD

CODE 52-704

PACK 12 PT

DESCRIPTION Good Brand Mayonnaise

S. MO IN COL 64 IN COL 65

CARD NO. IN COL 66 WT.

DATE	<u>6/9</u>	<u>9/29/47</u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
ACTUAL COST	<u>3.29</u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
ADJ. COST	<u>3.32</u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
COST CHECK	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
UNIT SRP	<u>19</u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
CASE SRP	<u>4.52</u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
C & C	<u>5.38</u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Relay - RWH

DATE	MEMO	SLOT	RECEIVED	PUNCHED	UNPUNCHED	HIGH
<u>3/29</u>	<u>12932</u>	<u>3124</u>	<u>100</u>	<u>100</u>	<u> </u>	<u> </u>
<u>4/15</u>	<u>13312</u>	<u>3124</u>	<u>250</u>	<u>100</u>	<u>150</u>	<u> </u>

Inventory adj.

COMBINATION
TUB MASTER AND
PUNCH RECORD

S (3)
L (2)
T (1) 1243

CODE 2256

24.8z Boraxo

PACK DESCRIPTION

DATE RECEIVED	QUANTITY RECEIVED	DATE	PUNCHED QUANTITY	BY
<i>Revised from</i>		<i>2556</i>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

TUB FILE WAREHOUSE DATE

TOM BORDEN, INC.
#M18499 BACK ELECTRO

Figure 15.--Examples of 2 types of setup cards used in tub files.

MINIMUM SIGNAL

CODE NO.

UNIT PACK SIZE

COMMODITY

BUYER

STOCK ON THIS ITEM IS NOW

AT MINIMUM POINT OF UNITS

To Buyer	Action Taken	To Order Dept.
<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>

OUT SIGNAL

CODE NO.

UNIT PACK SIZE

COMMODITY

BUYER

STOCK ON THIS ITEM NOW

OUT!

TO BUYER	ACTION TAKEN	TO ORDER DEPT.
<u> </u>	<u> </u>	<u> </u>
<u> </u>	<u> </u>	<u> </u>

Figure 16.--An effective type of "minimum" and "out" signal cards.

"Out" signal cards for the majority of items maintained in the files is recommended because buyers receive immediate notification that the supply is exhausted and it is necessary to restock as soon as possible. One company reported a 14 percent decrease in the out-of-stock status through installation of "out" signal cards and use of this type of buyer's signal. In another company a reduction in inventory stock of 1,200 cases after 60 days use of the "out" signal cards together with a reduction of "outs" from 5 to 3 percent of weekly dollar sales was accomplished. The use of the "out" signal card only, without the minimum signal, generally results in a 1- or 2-day delay in placing the order. In one instance, where minimum signals were used, the reorder point was set at a quantity corresponding to a half-week's supply on truck deliveries and 7 to 9 days on carlots. In another company the "out" signal card was inserted in the tub file behind the last 2 commodity cards in order to accelerate the ordering time.

Arrangement of Cards in Tub Files

A series of time studies has established that the most efficient method of removing cards from tub files is from the rear. Cards are pulled in descending order, with the highest serial numbers to the rear.

Each time stock is received, cards are punched and serially numbered in the quantity received. ^{3/} The cards are reproduced on the document-originating machine with end printing unit starting with the number 1 with count-controlled punching and numbering.

Figure 17 shows an effective way of filing cards in the tub files. All commodity and signal cards should be placed in front of the corresponding divider.

Cards measuring approximately 10 by 18 inches are placed on the edge of each tub file by many wholesale food distributors to show the beginning and ending code numbers of items located in the particular tub (fig. 18). Such a card is particularly beneficial to card pullers on small fill-in and telephone orders because the approximate location of items ordered can be determined by the cards.

Three basic types of dividers were used between items in the card tubs by firms cooperating in this study (fig. 19). The dividers measure 3.5 by 8.5 inches with a 1 inch strip across the top for writing the item code number. Dividers are made of plastic and stiff heavy fiberboard. The plastic dividers with the separate prongs are recommended for card dividers because tests with these dividers show an increase of 20 percent in card pulling productivity over use of the fiberboard dividers. The dividers with the separate prongs cost from 7 to 10 cents each. The solid flat plastic divider is not recommended because the first and last cards adhere to the divider surface because of static electricity.

^{3/} In the section entitled "Utilization of Receiving Cards" the reproduction of one extra card on each receiving for computing the weight received and for posting receiving data to buyer's records is described.

6122

TUB DIVIDER

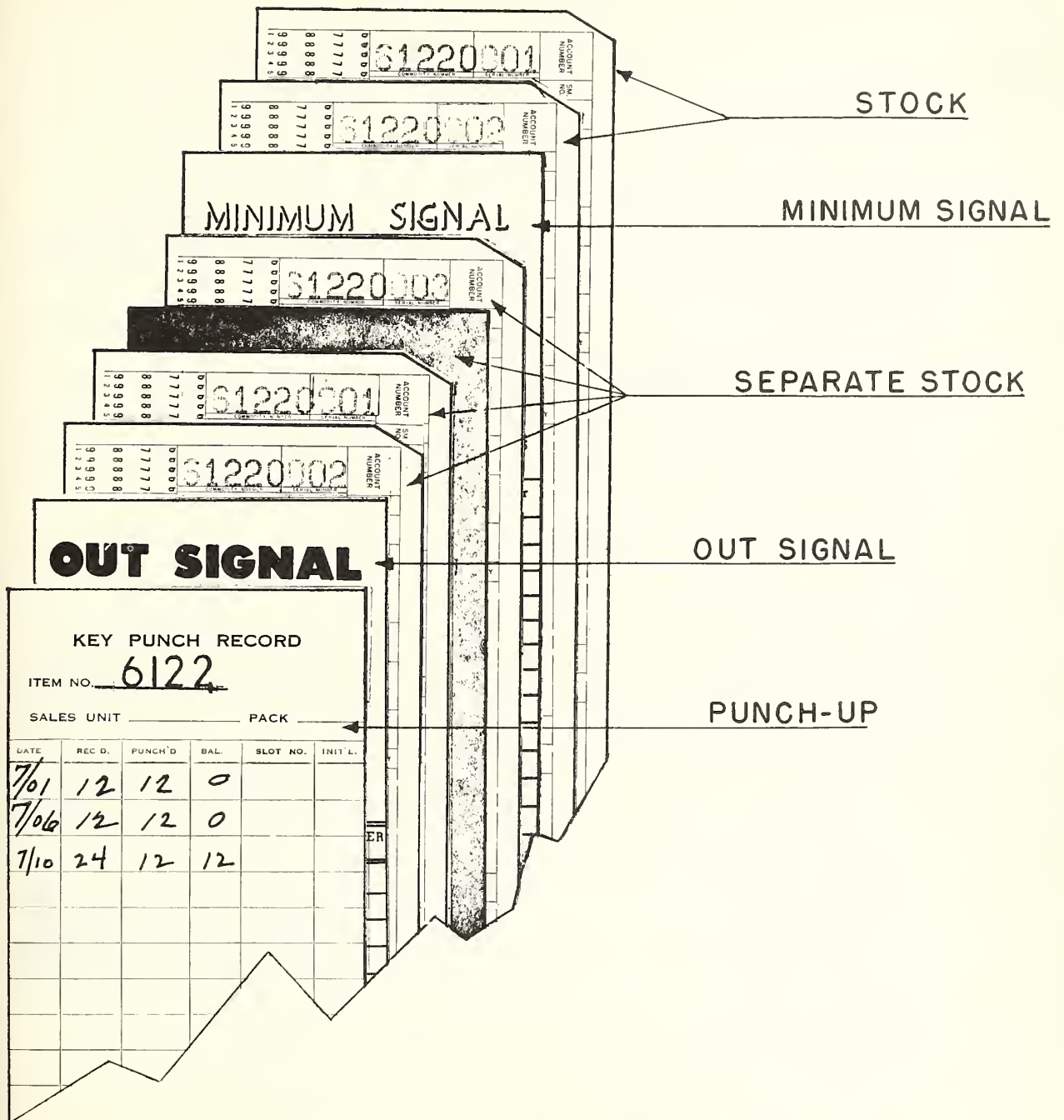


Figure 17.--The recommended method of arranging cards in tub files.

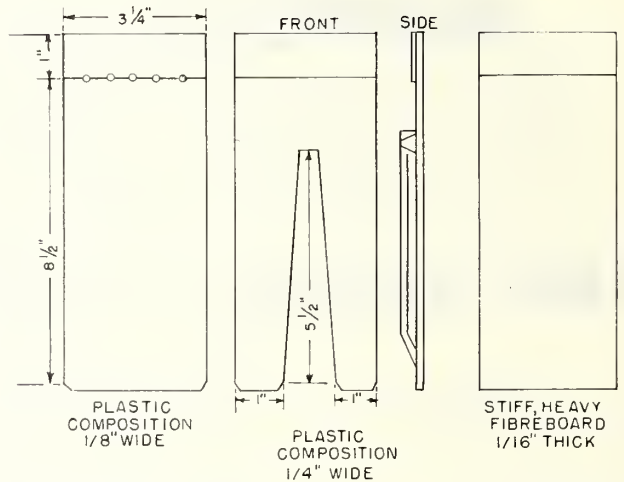
Productivity of Card Pullers

The greatest card pulling productivity achieved in any firm co-operating in this study was with use of the following methods and equipment: (1) Plastic dividers with prongs were used in the tub files; (2) cards were pulled from high to low (each receiving starting with the serial number "one"); (3) total travel area for pulling cards was 25 feet with 6 tubs placed in an "L" pattern; and (4) orders were pulled from a short form retailer order. Card pulling productivity with use of the described methods and equipment averaged 825 cards per man-hour with an average order size of 125 cases. Productivity of card pullers increases as order size increases. Table 10 shows the relationship of pulling method to productivity in several firms studied.

A number of the wholesalers studied use a special mailing sheet rather than the regular order book for obtaining merchandise orders from retailers thus increasing card pulling production (tub file method) or key punching (batch filling method, discussed in a later section) by 8 to 15 percent. These

TUB NO. 3
COMMODITY
12 430 TO 13 624

Figure 18.--Signs placed on the edge of card tubs to assist in locating items.



U.S. DEPARTMENT OF AGRICULTURE

NEG 6227-58(5) AMS

Figure 19.--Three types of dividers used to separate items in card tubs.

Table 10.--Productivity of card pullers by method used

Method	Order size	Cards pulled per man-hr.	Sections or orders timed
	Cases	Cards per hour	Number
Rotary card tubs.....	240	1,030	26
One person pulling from short order book...	125	825	6
One person pulling from a maximum of 2 card tubs.....	397	774	79
One person pulling entire order from card tubs.....	239	648	65

1/ Includes 15 percent personal and fatigue allowance.

sheets contain columns for the insertion of the commodity code number and quantity ordered. In some instances the mailing sheet has the commodities precoded and the retailer must write the quantity desired. The use of retail order form mailing sheets is recommended in preference to the large order books when customers can be induced to submit their orders on these sheets. The customary procedure is for the retailer to prepare his order in the large order books and then post the quantities desired from the order book to the code sheets. This procedure does require the retailer to spend additional time in transcribing his order.

The orders received by the retailers are listed on 4 pages by use of these sheets as compared with 30- to 50-page order books; in this way the possibility of missing a full page or several pages in the order book is reduced. Many retailers have indicated a preference for this method of ordering because a permanent record is available in the store for turnover and ordering analysis.

A part of a precoded retail order form mailing sheet is shown in figure 20. A columnar type of retail order form mailing sheet with the code numbers omitted is shown in figure 21. The columnar retail order form can also be used to accept retailer orders over the telephone.

CODE SHEET												RETAILERS NAME — STORE NO.					
MR. RETAILER:																	
This code sheet conforms																	
with order form dated: _____																	
↓ Line Up Number Next to Order Form Code No.																	
☆1		☆2		☆3		☆4		☆5		☆6		☆7		☆8		☆9	
002		073		140		206		284				436		504		580	
004		074		142		208		286				438		506		582	
006		076		144		210		287								584	
		080		146		212		288				444				586	
010		081		148		214		290				446		512		588	
012				150		216		292				448		514		590	
014		082		151		218		294				452		516		592	
015				152		220		296				454		518		594	
				153		224		298		388		456		520			

Figure 20.--A precoded retail order form mailing sheet.

Rotary Card Tub Files

One wholesale food distributor cooperating in this study reported substantial savings by substituting machine driven rotary tubs for the standard tub files. Three rotary tubs were acquired at a total cost of \$10,500. Analysis of the operation discloses that the savings in labor costs and increased card puller productivity repaid the costs within 16 months. Five card

DATE ORDERED 8-23-57 STORE # 26
 DATE WANTED 8-26-57 DEALER John Jones
 PICK-UP AM 9:45 PM STREET 375 Bentley
 DELIVERY AM. _____ PM. TOWN _____
 DAY CLOSED Business Hours

SALESMAN'S NO. _____
 RETAIL
 INSTITUTIONAL
 BANK CHECK
 C. O. D
 TRUCKER

SPring 6880

CS	CODE	CS	CODE	CS	CODE	CS	CODE	CS	CODE	CS	CODE	CS	CODE	CS	CODE

Add Specialtie

73-900

- TO SPEED UP ORDERING, THESE ARE A FEW THINGS TO DO:
1. USE A RED PENCIL
 2. COMPLETE ALL INFORMATION ON TOP OF THIS ORDER FORM
 3. KEEP ALL CODE #'S IN PROPER SEQUENCE AND GROUPING
 4. USE LETTER "S" FOR SUBSTITUTE IF AN ITEM ORDERED IS OUT AND YOU MUST HAVE IT IN ANOTHER BRAND
 5. USE LETTER "D" IF YOU WANT DEAL ONLY
 6. USE MAIL, PHONE, BAKERY DRIVER OR SALESMAN TO GET ORDER TO US; OR DROP IN OUR MAIL BOX AT UNION RD. FOR SPEEDY OUT OF TOWN SPECIAL DELIVERY
 7. FOR ORDER FORMS - ORDER CODE # 73900
 8. IF YOU CAN NOT FIND ITEM IN CATALOG WRITE IT IN LONGHAND
 9. USE FRONT OR BACK OF THIS ORDER FOR ANY SPECIAL MESSAGE TO US

Figure 21.--A columnar type retail order form mailing sheet.

pullers were able to perform the same work with the rotary card tubs as 8 card pullers with the standup tub files. Productivity of card pullers was increased from about 475 cards per hour on small orders to about 850 cards per hour and on larger orders production was increased from about 550 cards to about 1,075 cards per hour. A comparison of labor costs before installation and with use of rotary tubs is shown below.

Annual direct labor costs with standup card files

Eight card pullers at \$1.25 per hour	\$20,800.00
Fringe labor costs at 3 percent	624.00
Total direct labor costs in card pulling operation	<u>\$21,424.00</u>

Annual direct labor costs with rotary type card files

Five card pullers at \$1.25 per hour	\$13,000.00
Fringe labor costs at 3 percent	390.00
Total	<u>\$13,390.00</u>
Annual savings in direct labor costs	\$ 8,034.00

The rotary tub files are 60 inches high and 32 inches from the floor to the working shelf. They are 48 inches wide with a maximum arm reach of 24 inches. Each rotary tub file will hold from 375,000 to 400,000 cards.

The productivity of card pullers in assembling cards on several medium sized orders was time studied. Table 11 shows the card pulling productivity with use of the rotary tub operation.

Table 11.--The influence of order size on productivity of card pullers using rotary tub files

<u>Number of cases in order:</u>	<u>Elapsed time</u>	<u>Card puller productivity</u>
:	<u>Man-minutes</u>	<u>:Cards pulled per man-hour</u> ^{1/}
55.....	4.63	606
190.....	11.56	837
220.....	11.67	960
275.....	13.79	1,017
330.....	16.79	1,179
Total or average.....	58.44	920

^{1/} Includes 15 percent personal and fatigue allowance.

The 3 rotary tubs replaced 8 tub files in one company and provided more office space for other uses. Figure 22 shows a floor plan with the standup tub files and rotary tubs only.

Handling Substitutions, Promotional Items, and Price Changes

The use of automatic tabulating equipment enables the buying department to provide signals in the tub files for the substitution of items ordered and control of special promotional items (commonly termed "deals" in the industry). In many instances, manufacturers provide special promotions and temporary price reductions on regular items stocked. The processing of these items among the thousands of items ordered regularly becomes difficult when manual methods are used in the office.

Substitutions are generally made on similar items when brand names do not conflict, on bulk merchandise, canned fruits and vegetables (private or national label) particularly at the end of the season, olives of the same brand but different pack sizes, sliced dried beef, and cane sugar for beet or dark brown for light brown sugar.

As the buyer reviews "minimum" or "out" signal cards he decides whether or not a substitution can be made. If a substitution can be made a card is prepared for the item substituted and for the item used for substitution (fig. 23). The substitution cards are cross-referenced by commodity code number and placed in the card tubs. The card pullers fill orders on items as substituted in the routine manner. When the item substituted is received and cards are placed in the tubs, the tabulating department receiving clerk pulls both substitution notice signals and forwards to the buyer or destroys them.

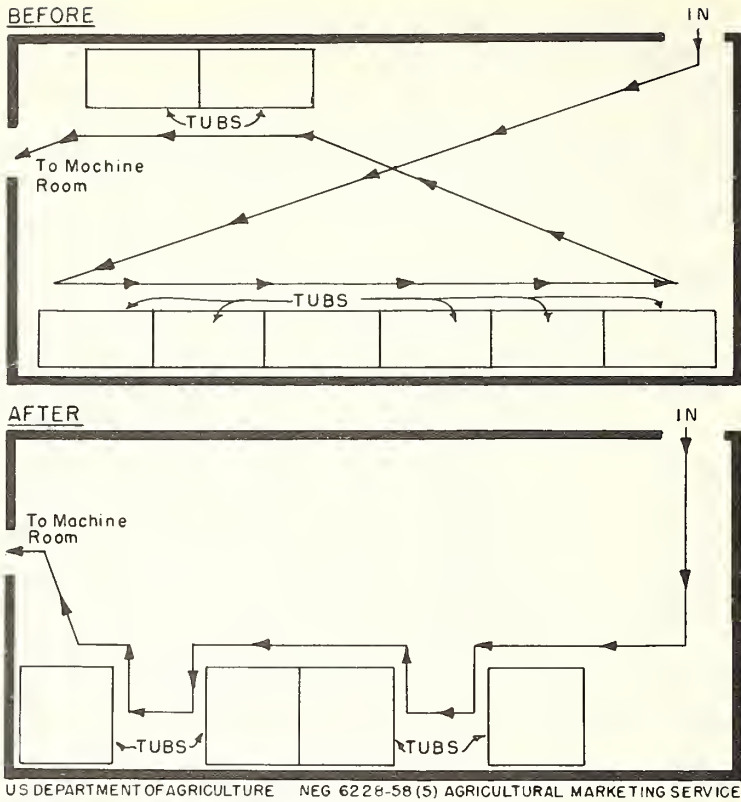


Figure 22.--Utilization of office space before and after installation of rotary tub files. Shows space saving and saving in travel distance.

ITEM # _____

SUB. # _____

1. WHEN OUT

2. IMMEDIATELY

Figure 23.--A signal card used to cross-reference substitutions.

Generally the buyer is notified by the broker or manufacturer as to promotional or price adjustments applying to regular items during periods of special advertising or sales available for retail distribution. There is an average of 65 to 75 special "deals" or promotional items in effect at all times. Wholesalers support the program by temporarily discontinuing shipments of the regular items and then reinstate the regular item upon completion of the promotion.

The method of handling deal items is similar to the handling of substitutions. The buyer places an order for the quantity desired. A temporary commodity code number is assigned to the special item. Substitution cards are prepared for the special deal item and another for the regular item. These cards are cross-referenced by commodity code number and placed in the tubs. The tabulating department is notified as to the quantity covered by the promotion and, on receiving stock notification, places in the tub the

required number of cards under the temporarily assigned code number. Card pullers then fill orders on these items as orders are processed in the routine manner from the order books. When the quantity covered by the promotional allowance is exhausted or price adjustment is removed, deal cards and the temporary commodity code are withdrawn. (Stock, if any, is transferred and signal cards destroyed.) Regular items are then used to fill the orders.

Prices for an average of 150 to 250 items are changed weekly due to changes in purchase price of the item or revision of the selling price. Following is the recommended method of changing the cards:

1. A price change notice is originated by the buying department.
2. The master commodity and pattern card is pulled from the files and the price change data and number of cards in tub file is inserted.
3. The old pattern card is placed in the read side of the key punch machine and a new pattern card is prepared on manual and machine punch basis reproducing all data required.
4. The trailer card is placed on the reproducing machine and the quantity required to replace incorrect cards is prepared.
5. The old incorrect cards are removed from tub files and quantity compared, and the old cards are then discarded and new cards placed in tubs.
6. The new master card is listed on the accounting machine and a report is submitted to the buying department to be checked for accuracy. In several instances, where this report was prepared, an average of 2 to 4 errors daily was discovered in pricing and quantity assignment, therefore it is important that these changes be checked for accuracy.

An important consideration in obtaining greater productivity at the card punch station is in reproducing change notices presenting all data in the same sequence as the card column assignment of the commodity card (fig. 24).

One wholesale food distributor verifies all price change computations mechanically by checking variation between cost and sell (profit) from the new master (pattern) cards. This procedure is recommended when columns are available on the commodity cards as the entire operation requires only a few minutes of machine time daily. With this method errors are detected at origination of the basic document. The method utilized is as follows:

1. Variation between cost and sell (profit) on retail customers is computed and punched into card columns 1 - 4.
2. Variation between cost and sell (profit) in institutional customers is computed and punched into card columns 5 - 7.
3. On completion of all price changes, the new pattern cards are machine listed, totals obtained of sell and cost, and cross-footed balances determined.

4228											MIN.	CARD NO.	
CODE NO	CLASS	WGT.	U	PAC.	J SIZE	DESCRIPTION						78	
20 - 23	44-B	5-6	46 - 8	50	51 - 57	58							
DATE	REC. NO.	QUAN.	LOW NO.	HIGH NO.	B	G I	COST	3 C RETAIL	C. P.	SHELF	REMARKS		
1/28		PC			2.49	2.65	1.98		2.17	.26	3500 - 3557 = 58 BP		
											<div style="font-size: 2em; font-family: cursive;">Price Change</div>		

Figure 24.--A price change notice with data listed in the same sequence as on commodity cards.

Any resulting variations are disclosed by the machine listing and checked and errors can then be corrected. The man and machine time required to process price changes is as follows:

<u>Element</u>	<u>Average time to process each price change</u> <u>Minutes</u>
Compute profit	0.19
Key punch new master cards	.25
Sight check for accuracy	.09
Reproduce new master cards for listing	.02
Machine list all cards	.02
Total	.57

An average of .57 minute is required to process each price change. An average of about 250 price changes are made each week, thus 142.5 minutes would be required to process the price changes. The additional time required for verification of accuracy in clerical and key punching operations totals .21 minute per price change, or the time required to compute profit and machine list all cards.

Handling Warehouse Location Changes With The Fixed and Floating Slot Systems

The 2 basic methods used in storing merchandise in the warehouse and in the order selection line based upon the customer's order are the floating slot system and the fixed slot system. There are modifications and variations used under both of these systems.

With the floating slot system, merchandise received at the warehouse is placed by warehouse receiving personnel in any vacant available slots on the selection line. The receiving clerk writes the slot number on the receiving ticket to indicate the warehouse location of the item. The tabulating department then manually key-punches warehouse location numbers into the master commodity card for reproduction into all related cards. The slot assignment is printed by accounting machine on the customer's invoice as an aid to the warehouse order selector in finding items ordered by the retailer.

With the fixed slot system the location of merchandise in the warehouse is predetermined and a fixed slot is assigned to each item on the basis of weight, bulk and velocity. The respective items are then always stored in the same slot on the selection line. The slot assignments are only reassigned due to changes in sales velocity, seasonal changes, addition of new items, or discontinuance of an item.

Whenever the warehouse location (slot assignment) of a particular item is changed, with either the floating or fixed slot methods, it is also necessary to change the commodity cards in the tub files. This must be done so that customer invoices prepared on the tabulating equipment will list the items ordered in warehouse slot sequence for order selectors in assembling the merchandise ordered.

In addition to changes in warehouse locations, reports are also required indicating warehouse merchandise damage for purposes of inventory control and adjustment of tub files under any system of warehouse storage. Several companies have reduced the necessity for different forms for information originating from the warehouse by combining various types of informative data onto one form. Figure 25 shows one combination of such data onto a form. Use of this form has reduced the cost of printing incident to maintaining and stocking one form for slot changes and another for damaged stock withdrawals.

The method of assigning warehouse locations to items has an influence on the efficiency of the office routine. With the floating slot system each item received into the warehouse must have a location number written on the receiving ticket. Delays from the time merchandise is stored and the tabulating department is notified of the receiving and the warehouse location average from 1.5 to 3 hours. An additional delay of from 15 minutes to 1 hour is encountered before cards are reproduced and placed in the tub file. With the floating slot system warehouse location numbers must be manually key-punched into the cards. Items received in the wholesale grocery business range from 900 to 1,700 weekly. Because of the manual operations in key-punching and the need for warehouse personnel to write location numbers for each item received, the possibilities of error are greater than with the fixed slot system.

With the fixed slot system, slots are assigned only at the time of establishing the selection line. The receiving reports can be sent directly to the tabulating department upon checking the merchandise without waiting until the merchandise is stored in the slot. The need for manually key-punching warehouse location numbers into the master card for each receiving is eliminated. The possibility of error is less and limited to failure to

NEW ITEM REPORT

Fargo

BRANCH NO. 4

DATE

CODE NO.

Family Group	Brand	Code	Detail	PACK	DESCRIPTION	DETAIL FOR TAB						F.O.B.	DEL'D	ADV	BOOK	SELLING	SRP	% DLR PRO	
						COST.	FRT	COST	CHG	PRICE	PRICE								
21	18	43			24/6oz. Canned Gaines Dog Food	G	A	I	N	E	S	4.95	2	4.97			4.97	2/51	

MFR. OR PACKERS
 NAME OR ADDRESS: General Foods BROKER:

2 % CASH DISCOUNT 10 DAYS F.O.B. Fargo FRT. PREPAID FRT. COLLECT FRT. ALLOWED \$ _____

HOW SHIP Split Car SALE GUARANTEED? YES _____ NO _____ FLOOR STOCK PROTECTION AGAINST MFR. OWN DECLINE _____ DAYS 42#

REASONS FOR BUYING AND MEMO:

DUN & BR. RATING _____ APPROVED BY: Buyer

Figure 26.--A layout used by one company for reporting a new item.
 Table 12.--Type and quantity of errors in card pulling operations

: Number :		Errors noted			
Company	: of	: Number	: Code	: Code	: Type of error
	: cards	: of	: number	: number	
	: checked	: errors	: ordered	: pulled	
	: Cases				
A	: 1,196	: 2	: None	: 20-225	: Two cards pulled in error
	: :	: 1	: 6-010	: 6-014	: Wrong number
B	: 1,782	: 1	: 2-224	: 2-224	: Two cases ordered, one pulled
	: :	: 1	: 91-229	: 90-329	: Wrong third digit pulled
	: :	: 1	: 30-455	: 31-455	: Wrong fourth digit pulled
	: :	: 1	: 54-420	: 53-420	: Wrong fourth digit pulled
	: :	: 3	: 53-300	: None	: Missed items ordered
C	: 1,510	: 1	: 15-501	: 15-501	: One card too many pulled
	: :	: 1	: 18-913	: 18-913	: Not enough cards pulled
	: :	: 1	: 20-314	: 20-314	: Not enough cards pulled
Totals	: 4,488	: 13	: :	: :	: :

Use of all digits in the commodity code in straight sequence on the order form and tub dividers results in more errors in card pulling operations as the personnel must remember all digits. Experience has shown that use of a definite skip between the second and third digits in a 5-digit code on the divider card separating the cards in the tub files reduces the errors considerably. The end printing device utilized on the reproducing machine permits printing of the code number on a "skip" basis. The various methods of end printing are shown below:

Method of end-printing

15 001	Recommended
150 01	Do not use
15001	Do not use

The error ratio has little impact on the card pulling speed as shown in table 13. Experience of the individual is the major influence on the error frequency. For this reason, the following procedures can be applied to the card pulling operation: (1) A number of orders pulled by new or inexperienced personnel should be checked until the average error of desired incidence is reached; and (2) orders pulled by experienced personnel can be checked on a nonrecurring and sporadic basis to ensure maintaining a proper relationship between card pulling speed and errors made.

Table 13.--Card puller error frequency, speed and average order size for a one-week period in one company

Employee	Cards pulled	Average number of cards per order	Cards pulled per hour	Cards checked for errors	Number of errors	Errors per 1,000 cards
A	14,197	130	437	5,030	6	1.19
B	17,451	114	582	7,730	30	3.88
C	22,877	163	602	10,185	22	2.16
D	17,970	130	625	9,865	23	2.33
E	30,033	255	801	7,325	11	1.50
F	14,258	115	505	5,875	13	2.21
Total or average	116,786	151	592	46,010	105	2.28

After the data were accumulated in this company, measures were taken to improve the card pulling speed and accuracy. A program of intensive training and close supervision of new help was instituted until desired standards were met. Orders were then spot-checked as to error frequency on all card pulling operations and an incentive contest for a 2-month period was conducted. The result of this program as reported by the company was a 75 percent decrease in error frequency with card pulling productivity remaining constant.

Preparation of Sales Invoices with Automatic
Tabulating Equipment

The information shown imprinted on customer invoices was generally uniform among the companies studied. The customer copy of the invoice usually showed the warehouse slot number, number of cases ordered and shipped, unit of shipment, pack and size, commodity description, suggested retail selling prices, cost per unit to customer, and total invoice amount. In most instances a copy of the invoice containing the same information as the customer invoice is retained in the company file. In addition the company copy of the invoice contains a total cost of merchandise sold for use in profit and loss accounting.

Among the companies studied either a single copy invoice with a perforated side strip or a multiple copy invoice with carbon inserts was used. Table 14 shows the extent of useage of different types of invoices by the companies studied.

Table 14.--Type of invoice used by companies studied

Type of invoice	Number of companies	Percent of total
	<u>Number</u>	<u>Percent</u>
Single copy with perforated side strip.....	2	10
Two-copy invoice.....	2	10
Three-copy invoice.....	10	50
Four-copy invoice.....	4	20
Five-copy invoice.....	1	5
Six-copy invoice.....	1	5
Total.....	20	100

The need for extra copies of the invoice is generally based upon the desire of management and the need for maintaining proper control over sales. In the majority of instances, one copy for the customer and a copy (carbon or perforated side strip) is recommended as sufficient for the majority of whole-sale food distributors (fig. 27). The retained copy can be processed in all subsequent office operations for accounts receivable, statistical analysis, and as a tracer copy.

The majority of companies studied used a 3-copy invoice as shown in table 14. The original of these copies is sent to the customer, the duplicate is a delivery copy that goes with the order and is signed by the customer and returned by the truck driver as evidence of delivery. The duplicate copy is then used for accounts receivable and statistical purposes and is retained as a permanent copy in the customer file. The triplicate copy is an office tracer copy, retained in the office in the event of loss of the first 2 copies. After the tracer copy has been matched with the delivery copy it is used for statistical purposes, filed in numerical sequence or destroyed.

In those instances where a fourth copy was prepared, this copy was customarily used by the warehouse for accumulating cases selected by order

PAGE NO

CUSTOMER NAME
STREET ADDRESS
CITY AND STATE

1 - 6768

LOCATION	Quantity	PACK and SIZE	DESCRIPTION	S R P	PRICE	EXTENSION	CODE
7105	1	24 S	CANADA MINTS	5 25	75	75	70164
7320	1	24 5 02	NO 211 HERSHEY'S MINIA	27	480	480	71130
7320	1	24 3 1/2 02	NECCO PEPPMINT MINTURE	29	490	490	71239
7410	1	12 12 02	NECCO JUMBO JELLY DROP	21	183	183	71633
7410	1	12 12 02	NECCO SPEARMINT LEAVES	21	183	183	71643
7410	1	24 3 1/2 02	RICHARDSON PASTEL MINT	19	340	340	73420
			77	2404		1751	

TOTAL CASES TOTAL REPACK WEIGHT RETAIL EXTENSION TOTAL SUPPLIES INVOICE AMOUNT

Figure 27.--A multipart invoice with an original and 2 carbon copies.

fillers and the tonnage of merchandise shipped. In addition, this copy was used by the shipping department for scheduling and routing deliveries.

The 2 firms that prepared a 5- and 6-copy invoice used a sectional system of order assembly in the warehouse and provided an order filler in each section with a complete copy of the invoice. With this system of order assembly it was recommended that wiring controls be installed in the accounting machine for instructing the machine to begin printing commodities located in a different warehouse section on the next page. This wiring is done on the control panel and the skip is initiated by an instruction card that is sorted in with the order. The instruction card impulses the accounting machine to begin printing items in another warehouse section on the following invoice page by activating the tape controlling the carriage used for feeding and spacing invoices through the accounting machine. The invoice pages are then manually separated by warehouse section and each order filler can be given those pages that pertain to his section. With use of the skip cards it was possible to reduce the number of copies from 6 to 3.

Figure 28 shows a one-part invoice with a perforated side strip of the type recommended for use by wholesale food distributors. This recommendation is made because there is a substantial reduction in the number of copies of invoices prepared. A wholesaler with an annual sales volume of \$6 million will process in excess of 100,000 invoices annually. A reduction in the number of copies prepared results in substantial savings in printing and filing costs. The retained office copy or a summary operation (summary punch machine hookup to accounting machine) summarizing the required arithmetical and statistical data onto a punched card may be used for subsequent accounts receivable and statistical operations. Also a load or delivery route sheet is always prepared for the truck driver's use in making deliveries. This sheet is then used for the customer's signature acknowledging delivery of the merchandise.

CUSTOMER'S PORTION OF INVOICE **PORTION RETAINED BY WHOLESALER**

<input type="radio"/> DELIVERY AM TRUCK				SOLO TO	PAGE NO.	INVOICE NUMBER	MO OAY YR	CUSTOMER NUMBER	PAGE NO.	INVOICE NUMBER	MO OAY YR
<input type="radio"/> PICK WEIGHT				CUSTOMER NUMBER	PRICE	DATE					
<input type="radio"/> WAITING ASSEMBLY RELEASED						29486					29486
	NO TYPE	ASSEMBLY	RELEASED								
	ED										
SLOT NO.	CASES	UNIT	CODE NO.	PACK & SIZE	DESCRIPTION	PER UNIT	EXTENSION	NO CASES	CODE	COST	EXTENSION

Figure 28.--A one-part invoice with a perforated side strip.

The extent of savings in paper cost with use of a single-copy invoice is shown in table 15. The cost data shown in table 15 are based on printing costs for the size paper indicated. No attempt has been made to determine the additional cost of filing extra copies of all customer invoices.

Another advantage of the single-copy invoice with tear-off strip is that it permits machine verification of the arithmetical accuracy of the machine accumulations and totals.

Another illustrated single copy invoice with perforated side strip is shown in figure 29. This particular copy has another tear-off strip along the bottom for customer signature. Upon delivery of the order, the customer signs in the proper space, the strip is separated and returned to the company by the truck driver.

Table 15.--A comparison of the paper cost of single-copy invoices with multi-copy invoices for a firm using 100,000 invoices annually

Invoice type	:Cost per: : 1,000 :invoices	:Annual cost: :for 100,000: : invoices	: Additional cost for : invoice carbon copies : (100,000 invoices)
	: <u>Dollars</u>	: <u>Dollars</u>	: <u>Dollars</u>
Single-copy, side strip tear-off	:	:	:
13-5/8" x 11".....	8.40	840	:
Multicopy 11-3/4" x 11"	:	:	:
2-copy.....	17.00	1,700	860
3-copy.....	27.00	2,700	1,860
4-copy.....	36.50	3,650	2,810
5-copy.....	46.50	4,650	3,810
6-copy.....	56.50	5,650	4,810
	:	:	:

STORE COPY H 245946					OFFICE COPY H 245946						
PIECES	PACK	SIZE	ITEM DESCRIPTION	ORDER CODE	UNIT RETAIL PRICE	EXTENSION	WGT	PIECES	ORDER CODE	EXTENSION	COST EXTENSION
STORE NAME				INVOICE NO							
PCS GROCERIES	CIGARETTES	TOBACCO	SNUFF	DELIVERY RECEIPT Received of " " " " " " goods herein described as good order except as noted. SIGN HERE							
REPACKS	ADVERTISING	WEIGHT									

Figure 29.--A single-copy invoice with perforated side strip for company use and perforated bottom strip for delivery receipt and signature.

Warehouse Scratch-Offs

A continual problem in billing operations and inventory control is "warehouse scratch-offs." The inventory control (tub files) contain cards indicating that the items are in the warehouse; cards are pulled on a customer order, and invoiced. The warehouse selector cannot find the item ordered so the item may be "scratched off" to indicate that the item has not been filled.

Warehouse scratch-offs may be caused by the warehouse order picker selecting a wrong item causing a corresponding discrepancy in the quantity shown on 2 items in the tub files, or an error can be made in the receiving department by reporting an incorrect amount received resulting in an incorrect quantity placed in tub files. There may be theft of merchandise in the warehouse or merchandise may be damaged in the warehouse and not reported to the tabulating department for adjustment of the tub files. Merchandise may be withdrawn from warehouse stock for internal use such as cleaning supplies or cafeteria usage without a report to the tabulating department.

When an item is not in stock the order selector either marks the out item by circling the quantity or drawing a line through the entire line of printing. The warehouse usually checks with the tabulating department on quantity of the item in the tub files. If a large quantity is reported in the tub files a further check is made in the warehouse to locate the item.

There are 2 basic methods used for correcting the invoice amount when warehouse scratch-offs occur. With the first method the warehouse controls the correction. The shipping clerk notes the scratch-offs, corrects the invoice total, recomputes the fee and makes any other necessary corrections. The advantage of this method is the corrected invoice is forwarded with the shipment. Disadvantages of this method include: (1) The warehouse control of computations results in possible loss of inventory control; (2) the delivery truck departure may be delayed while invoices are being corrected; and (3) if invoice totals are summary punched in the tabulating department a separate control must be made to get the information to the tabulating department.

With the second method the tabulating department controls the correction. Invoice totals are not changed with this method and a notation is stamped on the invoice "Credit to follow on scratch-off." After the delivery is made, the invoice is forwarded to the billing department for preparation of a credit memorandum. This is the recommended method of handling warehouse scratch-offs and includes the advantage of maintaining inventory control on warehouse scratch-offs, the origination of a credit memo serves as a method of analyzing the extent of scratch-offs and delivery trucks are not delayed because orders are processed as they are filled. Figure 30 shows a representative type of credit memorandum used for warehouse scratch-offs.

The last column in the credit memorandum in figure 30 is left blank for the insertion of cost on the retained copy for use in financial statement accounting.

One wholesale food distributor, by studying the reason for warehouse scratch-offs, shipped on the average 100 cases a week that might have been

otherwise deleted from the order. This wholesaler is using a modified fixed slot system with night order selection and daytime receiving in the warehouse. He had found that his warehouse scratch-offs were a result of merchandise being left on the shipping dock overnight, after being received; thus the item was not in warehouse stock at the time of selection. This condition was corrected by having all merchandise moved from the receiving dock and placed in selection slots before orders were assembled by the night crew.

DEALER'S COPY

NAME							DEALER NO.		REFERENCE NO.		DIVISION NO.	
ADDRESS							// / 5		C		2146	
LOT OR SLOT NO.	CODE NO.	PACK OR WEIGHT	DESCRIPTION					QTY.	PRICE	EXTENSION		
GROC.	PROD.	MEAT	FROZEN FOOD	SUNDRY A/C			SHIPMENT		TOTALS →			
							WAREHOUSE DIRECT					

CREDIT MEMO

Figure 30.--A representative type of credit memorandum.

Slots Empty Report

One company using a fixed slot system in the warehouse has developed a slots empty report by utilizing the master card when the tub quantity becomes exhausted. When a card puller obtains the last commodity card in the slot denoting that the item is exhausted, the master card is also pulled. At the end of the day, cards are sorted in slot sequence and listed by the accounting machine in slot sequence.

This list, known as a slots empty report, is submitted to the warehouse where a warehouseman checks the warehouse slots with the report. In slots where any stray cases are located, a notation is made on the list and the list is returned to the tabulating department where cards are reproduced as needed, to reinstate cases for subsequent order filling.

Use of the slots empty report resulted in accelerated warehouse filling of empty slots because the report showed empty slots and the company was immediately aware of the need for filling them. The report also enabled the tabulating department to reduce the out situation somewhat as stray cases are restored to tub stock. An average of 20 to 30 cases were added weekly in this company representing an average of \$5,200 to \$7,800 annually of merchandise sold on an accelerated basis. Ordinarily, these stray cases would not be accounted for until the next physical inventory or slot reassignment. Table 16 shows a summary of the number of empty slots as reported by the tabulating department and number of cases actually in the slot. Figure 31 shows a typical slots empty report.

Table 16.--Number of empty slots as reported by the tabulating department of days of the week and number of stray cases found in the slots as experienced in one company

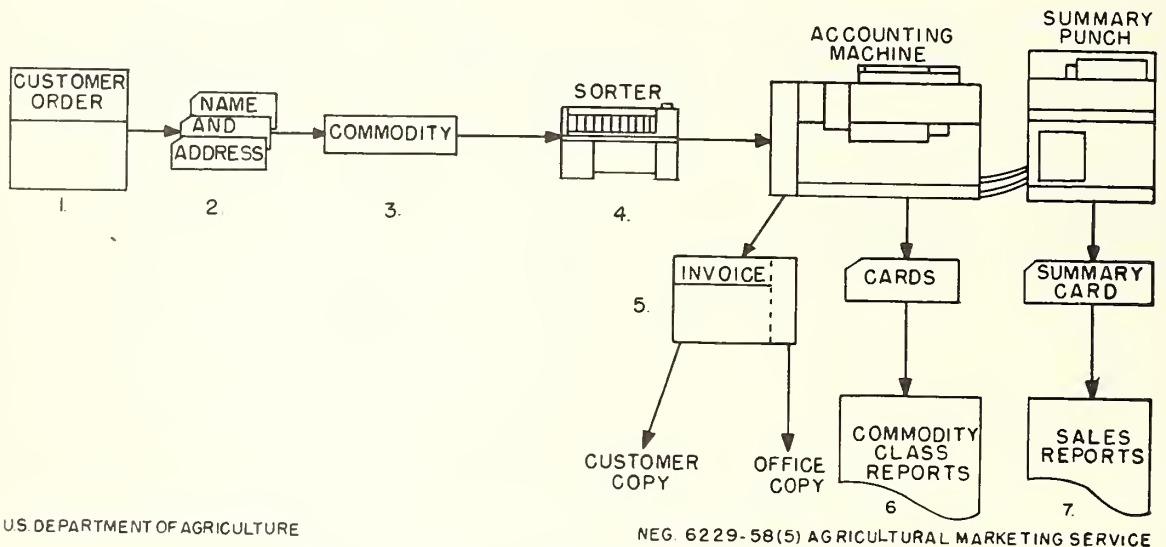
Date	Day of week	Number of empty slots-tub record	Stray cases reported by warehouse
		Number	Cases
September 16	Monday	72	8
September 17	Tuesday	66	9
September 18	Wednesday	78	14
September 19	Thursday	80	5
September 20	Friday	54	9
Total		350	45

DAILY EMPTY SLOTS			
SEPTEMBER 20 1957			
COMMODITY NO.		DESCRIPTION	SLOT NO. DISPOSITION
8554	CS 48	601RDY EVAP MILK BABY	1005 ✓
653	CS 12	4601OT UNSWT ORANGE JUICE	1467 <i>New Stock</i>
1554	CS	6#10 OT FINE CUT CARROTS	1801 ✓
7808	CS 24	3 1/2 OZ CL GERBER CHOPPED BEEF	1807 ✓
16876	BA 12	ES SCUFF KOTE LIQ BROW	1857 <i>New Stock</i>
11148	PK 24	3 D ZERTA VANILA PUDDING	1895 ✓
15872	CS 24	8001TIDY HOUSE SANDW BAGS	2392 ✓
12000	CS 6	3502SANALAC NO FAT DR MILK	2507 ✓
16712	CS 12	01BALL WIDE MOUTH CAP	67 2516 <i>1 case</i> ✓
11636	CS 24	118HILLS BROS DRIP COFFEE	2543 <i>2 cases</i> ✓
10134	CS 48	1201GRAF ROOT BEER SODA	2553 ✓
334	CS 24	#303RDY G N SLICED PEACHES	2578 ✓
6810	CS 24	#2 1/2 OT BEANS WITH PORK	2585 <i>2 cases</i> ✓
14114	CS 24	118COLONIAL POWDERD SUGAR	2805 ✓
14100	BC	11008COLONIAL CANE SUGAR	4008 ✓

Figure 31.--A typical slots empty report.

Flow of Paperwork in Preparation of Customer Order

The flow of paperwork and procedures involved in the preparation of customer order (fig. 32) was similar at each of the companies studied and is as follows: (1) Order is received from the customer and the order desk reviews the order and adds any specialty orders; (2) customer name and address cards are pulled from the tub files; (3) commodity cards are pulled for each item ordered; (4) commodity cards are sorted into warehouse slot sequence; (5) the invoice is prepared on the accounting machine and sent to warehouse for order assembly and delivery with the office copy retained in the file; (6) a summary card is simultaneously prepared on the summary punch which is connected with the accounting machine. The summary card is used for preparation of sales reports by customer, sales and cost of sales for invoice statements, and for accounts receivable; and (7) commodity cards are retained and used for sales reports by commodity class.



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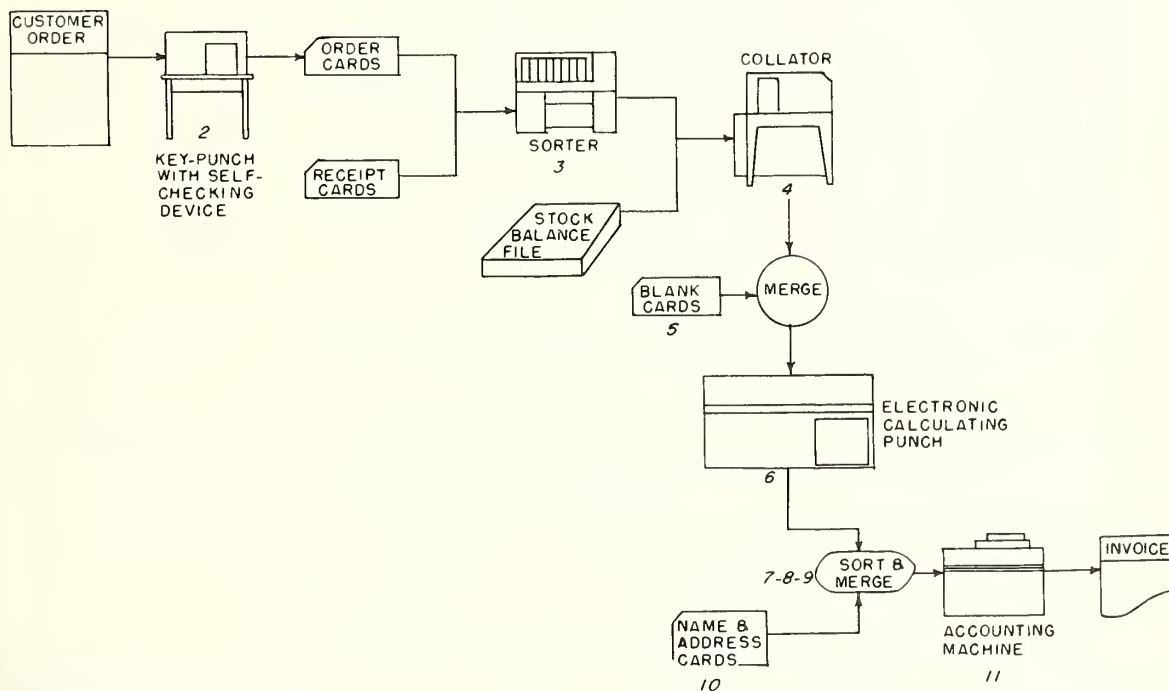
Figure 32.--Paperwork flow in preparation of customer order on tabulating machines.

Batch Billing Method of Invoice Preparation and Inventory Control

One of the leading electronic machine manufacturers has developed a method of preparing customer invoices combined with inventory control by use of the "batch billing" method using an electronic calculating punch. This method substitutes manual key punching for manual pulling of cards from tub files and all subsequent data is inserted into the cards by the electronic calculating punch. To provide for economical processing, orders should be received not less than 48 hours before delivery and all orders should be processed in not more than 2 batches daily.

The basic procedures and steps for the batch billing method of invoice preparation and inventory control is shown in figure 33 and are as follows: (1) Order form is prepared by retailer. (A sample page of the order form is

shown in figure 34); (2) the commodity card is key punched for each item ordered including the customer number (mechanically duplicated into each succeeding card of the order), the stock number, and the quantity ordered; (3) receipt cards are prepared for each item received into the warehouse during the day and are placed in front of order cards and sorted by stock number with receipts preceding corresponding order cards in each stock group; (4) receipt and order cards from step 3 are matched against stock-balance cards and merged with balance cards that match; (5) a blank card is filed behind each stock-number group and becomes the new balance card; (6) cards are then processed through the electronic calculating punch to gang punch product name, calculate new inventory value, calculate and punch units shipped, extend total cost and retail selling price, identify cards with incomplete shipments, and gang punch descriptive data and balance factors into blank cards for new balance--summary cards; (7) cards are sorted between old balance, new balance, receipts, and commodity; (8) new balance is merged--summary cards with stock balance file; (9) commodity cards are sorted into customer number sequence; (10) name and address cards are merged with commodity cards; and (11) invoices are prepared on the accounting machine. From this point the order is handled in the same manner as orders processed from tub files.



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Figure 33.--Workflow for the batch billing method of processing customer grocery invoices.

The order form shown in figure 34 has a 5-digit code number for items carried in stock plus a smaller number that is used as the self-checking digit number to verify the accuracy of the card punch-operator in punching numbers into cards.

Store Number		Name		Date Ordered		
Territory Number		Address		Shipping Date		
				November 18, 1957		
				Ship By		
21996 ⁴	22175 ⁴	22284 ⁴	22452 ⁷	22644 ⁹	22871 ⁸	23225 ⁶
21998 ⁰	22180 ⁴	22286 ⁹	22457 ⁶		22873 ⁴	23230 ⁶
21999 ⁸ T-O	22190 ³	22292 ⁷	22459 ²		22875 ⁹	23235 ⁵
22000 ⁴	22195 ²				22877 ⁰	23240 ⁵
22005 ³						
22048 ³	22235 ⁶	22360 ²	22455 ⁶	22750 ⁴		
22050 ⁹	22236 ⁴	22362 ⁸	22500 ³	22753 ⁸		
22052 ⁵	22237 ²	22364 ⁴	22505 ²	22765 ²		
22054 ¹	22239 ⁸	22400 ⁶		22770 ²		
22056 ⁶	22240 ⁶	22402 ²	22555 ⁷	22780 ¹	22982 ³	23400 ⁵
22058 ²	22245 ⁵	22404 ⁸			22984 ⁹	
22100 ²	22247 ¹	22406 ³				23415 ³
22102 ³	22249 ⁷	22408 ⁹	22575 ⁵		22989 ⁸	23417 ⁹
22103 ⁶	22252 ¹	22410 ⁵				23418 ⁷
22105 ¹	22253 ⁹				22993 ⁰	23419 ⁵
22110 ¹	22254 ⁷			22793 ⁴		23420 ³
22122 ⁶	22256 ²	22420 ⁴		22794 ⁴		
22130 ⁹	22260 ⁴		22582 ¹	22795 ⁹	23100 ¹	23425 ²
22135 ⁸	22262 ⁰	22425 ³		22810 ⁶		
22142 ⁴	22264 ⁶	22428 ⁷	22590 ⁴	22819 ⁷		23430 ²
22147 ³	22267 ⁹		22595 ³	22823 ⁹		
22150 ⁷	22268 ⁷	22432 ⁹	22598 ⁷		23125 ⁸	23435 ¹
22155 ⁶	22269 ⁵	22434 ⁵	22610 ⁰	22829 ⁶	23130 ³	
22158 ⁰	22270 ³	22436 ⁰	22615 ⁹	22851 ⁰	23140 ⁷	23440 ¹
22160 ⁶	22272 ⁹	22438 ⁶	22618 ³	22853 ⁶		
22162 ²	22274 ⁵		22620 ⁹		23200 ⁹	23445 ⁰
22163 ⁰		22440 ²	22625 ⁸			23500 ²
22165 ⁵	22280 ²	22445 ¹	22630 ⁸	22867 ⁶	23210 ⁸	23505 ¹
22170 ³	22282 ⁸	22450 ¹	22635 ⁷	22869 ²		23510 ¹
					23223 ¹	23512 ⁷

Figure 34.--A page of an order book used with the batch billing method of processing customer invoices.

The self-checking number device consists of an attachment on the card punch machine. This device permits punching and verification of numerical codes simultaneously by the machine. This method of verification finds approximately 97 percent of key punch or source document coding errors. It is particularly adaptable among wholesalers for punching and verifying of account numbers, customer numbers, and commodity code numbers.

The method developed for determining the self-checking digit is as follows: (1) Unit position and each alternate position of the basic code number are multiplied by 2; (2) digits in product and digits in basic code number not multiplied by 2 are cross added; (3) crossfooted total is subtracted from next higher number ending in zero; and (4) the difference is the check digit. The determinations are computed by the self-checking device automatically when it is attached to the card punch machine.

Examples of the computations for establishing the self-checking digit are shown in table 17. The examples are drawn from the order book shown in figure 34 using the lowest number (21996⁴), an intermediate number (22505²) and the highest number (23512⁷).

Table 17.--Computation of self-checking digit for commodity code numbers in figure 34

Self-checking procedure	Low number	Intermediate number	High number
Basic code number.....	21996 ⁴	22505 ²	23512 ⁷
First digit and each alter- nate digit.....	2 9 6	2 5 5	2 5 2
Multiply by 2.....	2	2	2
Product.....	5 9 2	5 1 0	5 0 4
Digits not multiplied by 2..	1 9	2 0	3 1
Cross add.....	5+1+9+9+2 = 26	5+2+1+0+0 = 8	5+3+0+1+4 = 13
Next higher number ending in zero.....	30	10	20
Subtract cross-added total..			
Check digit.....	4	2	7
Self-checking number.....	21996 ⁴	22505 ²	23512 ⁷

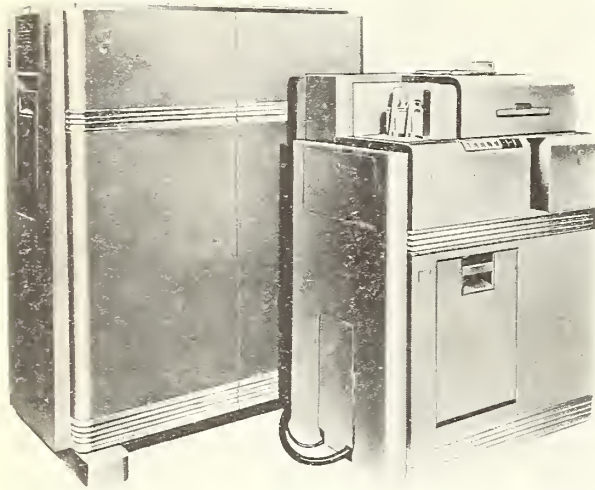
The batch billing system is considered satisfactory where customer orders are received at definite, scheduled times and small will-call or rush orders are held to a minimum. Newer developments in electronic highspeed computers are causing wholesale food distributors with large sales volumes to restudy and re-examine their present systems because of these new developments.

The equipment utilized for the batch-billing method includes the basic equipment customarily used in a tabulating department plus extra card punch machines, preferably with the self-checking digit attachment, a collator, and an electronic calculating punch with an attached punch unit. The equipment used by one wholesale food distributor studied in the batch billing operation is shown in table 18. This company processes from 35,000 to 36,000 cards weekly with an annual sales volume of over \$10 million.

Table 18.--Equipment utilized and approximate monthly rental with batch billing method

Machine descriptions	Number of machines	Approximate monthly rental
Accounting machine.....	1	\$ 434.50
Sorter.....	1	60.50
Collator.....	1	110.00
Document originating punch.....	1	137.50
Card punches with self-checking device.....	2	99.00
Card punch (no self-checking device).....	1	66.00
Electronic calculating punch.....	1	462.00
Punch unit for electronic calculating punch..	1	170.00
Total approximate monthly rental.....		\$1,539.50

The collator is a machine used for interfiling or merging groups of cards. The machine collates by comparing 2 different cards (each in a separate deck) and merging the cards in any desired sequence. In the batch billing operation this machine is used in the merging operation detailed in steps 4, 8, and 10 of the procedure flow shown in figure 33.



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Figure 35.--An electronic calculating punch.

The electronic calculating punch, shown in figure 35, reads factors punched into cards and performs addition, subtraction, crossfooting, and multiplication operations. These results are punched into the cards at a constant speed of 100 cards per minute. Another machine serves as a punching unit when connected with the calculating punch. In the batch billing operation, these machines are used for calculations and extensions of balances and inventory balances as shown in step 6 of the procedure flow in figure 33.

Table 19 shows the cost experience in one company that changed from the tub file method to the batch billing method. The sales volume of this company was in excess of \$10 million.

Table 19.--Changes in monthly tabulating costs with use of batch billing compared with tub file method

Cost element	Costs eliminated	Additional costs
	from tub file basis	incurred with batch
	with change	billing method
	<u>Dollars</u>	<u>Dollars</u>
Labor		
Card pullers.....	720.00	
Produce billing.....	660.00	
Additional key-punch costs.....		300.00
Machine		
Electronic calculating punch with punch unit.....		632.00
Two additional key-punches with self-checking device.....		99.00
Collator.....		93.50
Reduction in rental of document-originating machine by elimination of numbering device.....	24.20	
Total cost change.....	1,404.20	1,124.50
Total monthly saving.....		279.70

Prior to installation of batch billing procedures, the company billed produce with hand methods; with installation of batch billing, produce sales were machine billed. The overall monthly saving with batch billing method totaled \$279.70 and part of this saving can be attributed to the use of tabulating equipment for produce billing.

Key punchers averaged 1,156 cards per hour with orders of 200 cases in the batch billing operation (table 20). Card pullers at a stand-up file would have a productivity of approximately 800 cards per hour and with a rotary file would total approximately 1,000 cards per hour. With the batch billing method the key punch operator has to manually punch the quantity ordered and the commodity code into blank cards for invoice preparation. The manual punching consists of either 1 or 2 digits for the quantity ordered and 5 digits for the commodity code. As shown in table 20, cards are punched at the rate of more than 1,000 per man-hour.

Table 20.--Productivity of the key punch operators with batch billing methods

Operator	Productive time <u>1/</u>	Number of	Cards punched
	Man-minutes	cards punched	per hour
		Number	Number
A	52.32	1,125	1,220
B	37.60	665	1,061
Total or average	92.92	1,790	1,156

1/ Includes 15 percent personal and fatigue allowance.

Out-of-Stock Reports

Many wholesale food distributors try to supply the superette and supermarket operators affiliated with them with all of their store needs so the retailer can devote all of his attention to selling and merchandising in the store. Since the wholesaler assumes most of the retailer's buying function, the management of the wholesale food distribution business finds it helpful to obtain a daily out-of-stock report. This report is frequently used as a measure of the job their company is doing in supplying retailer needs.

There are 2 basic methods used in preparing out-of-stock reports mechanically. With the first method the card puller pulls a "unit out" card for each item out of stock to indicate the fact that an order has been placed for the item but it is not in stock. With the second method the card puller posts the item ordered but not shipped to a "tally out" card. With both methods, unit out cards or tally out cards are machine processed with use of accounting machines to prepare the out-of-stock report (fig. 36).

With the unit out card method whenever commodity cards in tub files are exhausted a supply of out cards (10 to 25) is reproduced on the reproducing machine or pulled from a reserve tub and placed in working tubs. The unit out card is similar to the regular commodity card with all data prepunched plus an

ITEM NUMBER		SEQUENCE NO.	SALESMAN		LOCATION	CONTAINER	DESCRIPTION OF ITEM	PACK SIZE	HEIGHT	PRICES	RETAIL SUNFLOWER STONES	RETAIL CASE GROUP	COST PRICE CHANGE	REWORK
4525														
0000	0000	0	0000000	0	0000	0	000000	0	00	00	00	00	00	00
10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1111	1111	1111	1111	1111	1111	1111	1111	1111	110	111	111	111	111	111
22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
3333	333	33333333	33333333	33333333	33333333	33333333	33333333	33333333	33333333	33333333	33333333	33333333	33333333	33333333
4444	4444	44444444	44444444	44444444	44444444	44444444	44444444	44444444	44444444	44444444	44444444	44444444	44444444	44444444
5	5	55555555	55555555	55555555	55555555	55555555	55555555	55555555	55555555	55555555	55555555	55555555	55555555	55555555
6666	6666	66666666	66666666	66666666	66666666	66666666	66666666	66666666	66666666	66666666	66666666	66666666	66666666	66666666
7777	7777	77777777	77777777	77777777	77777777	77777777	77777777	77777777	77777777	77777777	77777777	77777777	77777777	77777777
8888	8888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888	88888888
9999	9999	99999999	99999999	99999999	99999999	99999999	99999999	99999999	99999999	99999999	99999999	99999999	99999999	99999999

1	2	3		
4	5	6	7	8
9	10	11	12	13
14	15	16	17	18
19	20	21	22	23
44	47	46	45	44
39	42	41	40	39
34	37	36	35	34
29	32	31	30	29
24	27	26	25	24

UNIT OUT CARD

TALLY OUT CARD

Figure 36.--Two types of out cards used by wholesale food distributors.

out indication and it is usually a different color from regular commodity cards. As cards are pulled to fill the order, the card puller also pulls out cards on all items ordered but not filled. The out cards are processed with the balance of cards and invoice is prepared including a listing of out items. The out cards are separated from the rest of the commodity cards and are sorted into commodity code sequence and machine processed to prepare an out report (fig. 37).

With the tally out method whenever commodity cards in tub files are exhausted, a single tally out card is inserted in tubs. The tally out card consists of a regular commodity card with the tally imprinted on the reverse side and all data, except quantity is prepunched in the card. As cards are pulled to fill the order, the card puller posts quantity ordered but not filled on the

12 7 56 ITEMS MARKED OUT									
3160	1	12	14	oz	702	PETTIJOHNS	CERFAL	222	10434
3179	1	10	5	lb		TEA	TABLE GRAN MEAL	332	10820
3347	4	12	14	oz		DL PILLS	GINGERBREAD	864	11533
3222	1	12	13	1/2 oz		NESTLE	TOLL HOUSE COOK	376	11616
3249	1	12	15		81	NESTLE	EVERDY COCUA	530	14529
4339	3		48			CAMP	CHKN NOODLE SOUP	2097	25125
4307	8		48			CAMPBELLS	VEG SOUP	4464	25157
4335	6		48			CAMP	VEG REEF SOUP	4194	25163
4284	2		48			CAMP	VEGETARIAN VEG SO	1116	25165
4284	1		48			CAMPBELLS	CLAM CHOWDER	699	25211
3266	1	24	15	oz		SNOWS	CLAM CHOWDER	523	25221
3290	1	50		oz		SPRT	NOR KIP SNACKS	479	28140
3288	3	12	12	oz		STAR	CHOPPED HAM	1599	28314
3490	1	24	303			SUPERBA	WHOLE BEFTS	321	29107
4430	4	24	303			PACKERS	GRAPEFRUIT SEC	1386	34712
3468	1	24	25			SUP	PINEAPPLE CRUSHED	521	35616
4268	2	24	7	oz		BIG TOP	SHERRET PNUIT	1486	41105
4257	2	24	9	1/2 oz		BIG TOP	GOBLET PNUIT B	1798	41106
3271	4	12	16	oz		IGA	SALAD DRESSING	1156	41702
					1800			434.82	358.26
					(WEIGHT)			(RETAIL SALES VALUE)	(BUSINESS LOST)

Figure 37.--An out-of-stock report prepared with use of unit out cards with totals of weight, retail sales value, and wholesale value (business lost) shown.

tally out card in succeeding blocks to indicate the number of times ordered by customers. The invoice is prepared but out items cannot be indicated on the sales invoice. At the end of the day tally out cards are removed from tub files and quantity ordered is totaled. The tally out cards are machine listed and then totals ordered posted, extended and totaled on a calculator for the out report (fig. 38).

With both methods the location of items out of stock in the tub files is facilitated by reversing the tub file divider and having the commodity identification tag insert printed on a color (red) card. This notifies the card puller and reproducing machine operator that out cards are in the tub. In some instances, the out card contains a buyer identification for sorting of the cards for preparation of the "out" report by buyer sequence.

In many instances, a delay occurs in preparing the out cards because card pullers, when the last card in the tub is pulled, must notify the reproducing machine operator to reproduce a supply of out cards for insertion in the tubs. Several wholesale grocers have solved this problem by maintaining a reserve supply of out cards in a tub file for most items carried in stock.

recommended. In addition to the dollar savings the tally out card method shows the number of customers ordering the item out of stock which is not provided with the unit out card. With the tally out card method, items ordered and out of stock are not listed on the invoice. If an order book with separate mailing sheets is used to place the order, retailers in most instances will not object to items out of stock not being listed on the invoice.

Table 21.--A comparison of the weekly cost of preparing out-of-stock reports with 2 methods

Method	Labor cost	Machine cost	Card cost	Total cost
	Dollars	Dollars	Dollars	Dollars
Unit out card method.....	10.32	22.18	2.65	35.15
Tally card method.....	9.45	2.61	.45	12.51
Weekly saving with tally card method.....	.87	19.57	2.20	22.64

Using Available Tabulating Equipment Time to Prepare
Helpful Byproduct Reports

The speed of the tabulating equipment combined with the fact that the cards used originate with the invoicing operation leaves time for the preparation of byproduct reports that are helpful to management in the operation of the business. These usually consist of: (1) Analysis of commodity sales by individual items or family groups for turnover and gross or retail profit analysis; (2) analysis of sales by customer and sales representative; and (3) stock status summaries.

The preparation of daily gross profit reports by commodity "family" class is prevalent among wholesale food distributors for a 2-fold purpose: (1) Analysis of sell and cost on daily basis of all cards processed serves as verification of machine arithmetical accuracy in processing customer orders; and (2) reports for management analysis as to the turnover of various commodity groups on a buyer, branch and territory basis.

One company, by analyzing the identical cards, prepares 8 types of reports for various executives. The retail sales price and warehouse cost was reported as follows: (1) By branch and delivery zone; (2) by branch and commodity class; (3) by branch, delivery zones, and merchandise buyer by commodity class; (4) by branch, delivery zone, and merchandise buyer; (5) by branch and merchandise buyer; (6) by warehouse, delivery zone, and commodity class; (7) by warehouse and commodity class for company owned retail stores; and (8) by warehouse and commodity class for independent retail stores.

Figure 40 shows a daily gross profit report with the cost, amount sold to stores, and the number of cases sold. Figure 41 shows a report issued monthly and includes 2 additional features: (1) Total tonnage (weight) sold; and (2) the retail sales value obtainable by customers if the retail prices suggested by the company are followed.

COMMODITY CLASS CODE	COST	SALES VALUE	CARD COUNT (CASES)
00 30	140	186	2
03 01	1360	1509	5
03 07	10955	12342	39
03 09	3227	3461	12
03 11	2918	3204	10
03 15	1045	1124	2
03 16	11708	13043	37
03 17	5012	5377	17
03 19	5274	5817	16
03 21	9945	10617	30
03 23	1900	2065	6
03 31	187	19207	
07 25	4966	5438	11
07 27	657	720	3
07 29	384	426	2
07 31	367	401	1
07 43	1076	1180	4
07 49	2309	2498	5
07 51	494	530	2
07 53	1548	1680	3
07 55	555	625	1
07 59	482	524	2
07 61	374	405	1
09 01	580	630	2

Figure 40.--A daily gross profit report with analysis by family groups of items.

COMMODITY CLASS	WEIGHT	EXTENDED RETAIL SALES VALUE	SALES TO CUSTOMERS	ACTUAL COST
2 LBY GREEN PEAS	2738	108088	84327	76131
4 DIXIE B CUTLET	98	3648	2720	2440
6 WISC BEER BRIC	690	41563	34830	34262
8 MORRELL CANNED	640	26086	22211	20736
10 DC DELIT WHIP	289	4668	3575	3419
12 WIS REALGLD OR	5975	55716	43827	42378
14 WLDRNS CHRRY P	4604	87580	67513	63863
16 R&W FR STY GR	9565	129896	99752	95319
18 CAMP TOMATO SO	5193	84440	72264	71794
20 WHLER CHICKEN	39	3364	2536	2523
22 STRKST GR CH T	1134	61464	47791	46217
24 RED&W CORN BEE	2132	62496	48802	47761
26 GERBR STR VEG&	1679	36748	31708	31522
28 CARNATON MILK	2424	39540	33773	33657
30 RASPBERRY JEL	857	25080	20531	11528
84 R&W BOOK MATCH	1760	85001	57273	55023
86 TIDE	7824	144750	123221	122957
88 SCOTT FACIAL T	5185	132550	99130	97110
90 KEN L RATION D	3288	27853	21507	21275
92 WIS K S KOOLS	1033	216385	202302	197743
94 T H FRZR WRAP	22	828	565	540
96 R&W IMPRINT BA	2664		52242	46479
98 AMY DOLLS 24 I	78	8970	7650	7067
	117239	280324	22524553	2253959

Figure 41.--A monthly gross and retail price analysis by family groups of items.

Another type of report issued by some companies as byproduct information includes a sales analysis with the following information: (1) Sales by product group - grocery, produce, frozen food, and meat; (2) sales by method of payment - cost plus, regular, institutional, cash sales, and other; (3) sales by customer; and (4) sales by field representatives. A report of this type (fig. 42) shows a weekly sales analysis by customer, product group, and sales representatives.

PAUL JONES MARCH 1957						
CUSTOMER	GROCERY	PRODUCE	MEAT	FROZEN FOODS	DAIRY	TOTAL
AMERICAN	426073	57405	7450	55707	29482	576117
AMERICAN SALES CO.	60618	7785	29058	4771	5995	108227
AMERICAN	266371	34718		14350	22617	338056
AMERICAN	38383	4425	2437	1063	4962	51270
AMERICAN	696935	182312	407923	146584	96369	1530123
AMERICAN	435281	28135		17200	9756	490372
AMERICAN	425574	48696		18843	17116	510229
AMERICAN	121863	19455	5918	12156	8402	167794
AMERICAN	76605	8785		5619	2950	93959
AMERICAN	77370	7655	22260	10934	6463	124682
AMERICAN	291079	31880	34780	21704	23655	403098
AMERICAN	380745	25405		16519	41263	463932
AMERICAN	363211	48677		15044	80485	507417
AMERICAN	912014	140170	247585	91629	108554	1499952
AMERICAN	120231	6300	1930	4467	7351	140279
	692353	651803	759341	436590	465420	7005507

Figure 42.--Weekly sales analysis by field representative, customer, and product group.

The stock status report is primarily designed to inform the buyers on turnover in terms of units sold, stock on hand or on order. It is used to determine movement of each commodity inventoried and enables the buyer to project buying requirements (fig. 43).

BUYER CODE	COMMODITY	MONTH		PRIOR MONTH SALES	YEAR TO DATE SALES	ON HAND	ON ORDER
		CURRENT WEEKS SALES	TO DATE SALES				
1 24 15	SL AOPLESAUCE GLS	11	31	102	824	134	9999
1 24 303	SWEET LIFE APPLES35	41	108	259	2463	251	9999
1 24 8	SW LIFE APPLESAUCE	11	32	71	580	95	9999
1 24 303	JESSO APPLESAUCE5	54	237	320	2307	266	250
1 24 303	MOTTS APPLESAUCE	65	133	383	3089	158	200
1 12 25	MOTTS APPLESAUCE	28	61	154	538	76	44
1 24 303	S L APPLEBERRY SCE	26	26	9	442	174	9999
1 24 2 /	SLIFE WH PEEL APRCT	4	9	16	165	6	40
1 24 303	S LIFE WH PEEL APRC	10	17	38	342	16	200
1 24 2 /	S L WH UNPLD SPRICT	2	3	7	58	42	9999
1 24 BUF	SLIFE HV UNP APRCOT	9999	4	21	107	99999	50
1 24 303	LIBBY W PEEL APRCT	7	10	32	239	59	9999
1 24 2 /	LIBBY HV UNP APRCOT	6	10	17	127	39	9999
1 24 BUF	LIBBY HV UNP APRCOT	10	20	20	231	42	35
1 24 303	S LIFE BLUEBERRIES	4	12	47	334	34	9999
1 24 300	ONE PIE BLUEBERRIES	2	10	31	263	27	9999

Figure 43.--A weekly stock status report.

The machine preparation of the reports shown and described in this section utilizes only the sorter and accounting machine. In some instances with use of the summary punch, balances are carried forward or accumulated daily, then weekly, and finally monthly to prepare the reports. Preparation of these cards can be accomplished only if machines are available, particularly the accounting machine. These reports will generally require from 1 to 3 hours daily if all commodity cards are analyzed.

Utilization of Receiving Cards for Byproduct Reports

Wholesalers process receivings through the reproducing punch to prepare both an inbound tonnage report and slot verification report. The procedures are as follows: (1) The receiving report is obtained from the warehouse and the master commodity card is pulled. The reproducing punch operator obtains a prenumbered card from the master deck with warehouse slot noted representing quantity to be punched plus one (for example, if 40 cases are received, 41 cards are reproduced); (2) prenumbered cards are inserted behind the master card and placed in the read unit of the reproducing punch; (3) the reproducing punch

reproduces the quantity of cards required while simultaneously end-printing commodity code number and serial numbers. The extra card is removed for use as inbound tonnage report and slot verification and the balance of the cards are filed in active tubs; and (4) a single card is key-punched as to actual quantity received and accounting machine listed in slot sequence. This list is checked by warehouse personnel and in many instances discloses 2 to 3 errors or slot reassignments daily. These errors would not be discovered for several days if this check was not made and sales losses may result. Cards are then extended (comptometer or calculator) as to quantity times weight and quantity times cost price. Cards are sorted into commodity code sequence and accounting machine listed in duplicate with one copy used for the inbound tonnage report and the second copy used for posting directly to the buyer's stock cards. A report prepared for slot verification is shown in figure 44.

COMMODITY CODE NUMBER		DESCRIPTION	WAREHOUSE NUMBER SLOT NUMBER	OF CASES
12238	CS 24	70% TINS MIXED NUTS	2127	20
6564	CS 12	40% KITCHEN BOUQUET	2317	40
2384	CS 48	6% CHICK OF SEA CH STY TU	2393	80
2615	CS 48	7% BL SILVER SIDE SALMON	2505	120
281	CS 24#2	OT SLICED PINEAPPLE	2528	79
17685	CS 4	1% LINCO BLEACH DEAL	2528	108
690	CS 24#2	RDY PINEAPPLE JUICE	2565	46
1241	CS 24	8% OT MEDIUM EARLY PEAS	2574	120
1048	CS 24	8% RDY CR STYLE GOLD CORN	2592	140
5274	CS 12	OT RDYS CIDER VINEGAR	2604	100
17670	CS 12	OT HILEX	2606	200
16548	CS 72	200 SHEET SCOTTIES NO 8220	2612	60
726	CS 12320	6% SUNSWEET PRUNE JUICE	2615	233
16214	CS 96	RLCHARMIN TISSUE WHITE	2618	50
15204	CS 24	9% POST SUGAR CRISP	2624	156
16514	CS 12	48 NO 113 ECON MODESS	2635	70
16264	CS 48	RLSOFT WEVE YELOW TISSUE	2642	42
16252	CS 100#30	SOFT WEVE WHITE TISSUE	2707	36
16294	CS 50#14	SCOTT ROLL TOWELS	2715	72
16216	CS 96	RLCHARMIN COLORED TISSUE	2728	250
18492	CS 24	1% SURF LARGE	2746	15
17674	CS 4	1% HILEX	2805	400
16570	CS 12	GOOD VALUE BROOMS	2825	40
15770	CS 4	10% PURINA DOG CHOW	2826	40
15188	CS 24	12% POST GRAPENUT FLAKES	3007	198
15458	CS 24	6% RICE CHEX	3011	66
12348	CS 12	12% RDY MEDIUM NOODLES	3016	240

Figure 44.--An inbound receiving warehouse slot verification report.

When the purchase order is not originated by a machine method, additional clerical time is required to code receivings for pulling pattern cards and also to post items received on the stock cards usually kept by the buyers. Reproduction of the extra card at the time of preparing receipt cards for tub files serves to reduce the posting time when the stock cards are kept in commodity code sequence.

In one instance, the estimated clerical costs saved by eliminating the need for coding each item received and skip posting to buyer's cards by substitution of one extra card through the reproducing machine amounted to approximately 115 hours weekly. At this company, clerical time was needed to code each item received as reported by the warehouse. In addition, the buyer's stock cards were maintained in related groups rather than in vendor sequence making it necessary to post warehouse receivings on a skip-posting basis because items are not kept on buyer's cards in straight numerical sequence. A sequence of listing on a buyer's stock card at one company follows:

<u>Code sequence</u>	<u>Item</u>
25 861	12/5 oz. Lea Perrin Sauce
25 869	12/10 oz. L & P Worcester Sauce
25 632	12/2 oz. Bouquet Seasoning
25 639	12/4 oz. Bouquet Seasoning
93 030	12/1 qt. Bouquet Seasoning
42 758	1 lb. Accent Seasoning
42 750	2 1/4 oz. Accent Seasoning

As shown in the time study data in table 22, the productivity of clerical personnel was increased more than 100 percent by eliminating the need for coding each receiving item and skip posting to buyer's card with use of one extra card through the reproducing machine.

Table 22.--A comparison of clerical posting time required with former and improved methods

		Former method			Improved method	
		Five-digit	Skip	Total	No coding and	
Warehouse Receivings		coding of	posting		sequence post-	
		warehouse	to buyer's		ing to buyers	
		receivings	stock card		stock card	
Vendors	Items	Man-minutes	Man-minutes	Man-minutes	Man-minutes	
45	248	108.57	126.85	235.42	113.34	
40	224	97.92	114.58	212.50	102.37	
45	196	87.98	100.25	188.23	89.57	
37	175	77.82	89.51	167.33	79.98	
25	64	31.10	32.74	63.84	29.25	
192	907	403.39	463.93	867.32	444.51	

Number of items posted per man-hour 63 131

Machine Room and Tub File Layout

The effective utilization of tabulating equipment for the grocery billing operation requires that the tub files and machines be arranged in such a way as to reduce travel time from tub file to tub file and from machine to machine to a minimum.

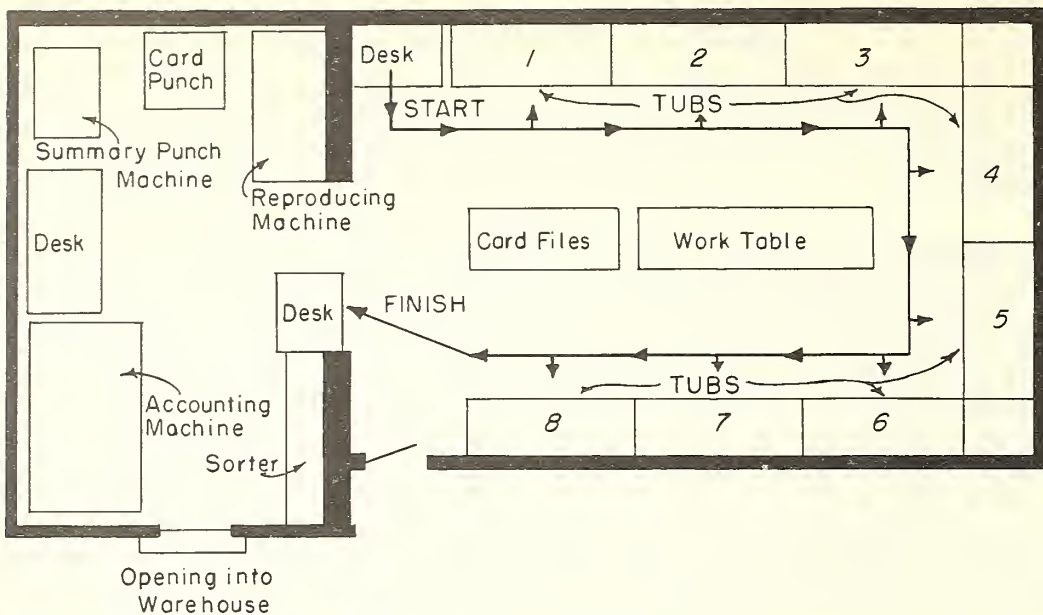
The proper arrangement of the tub files in the tabulating department requires that: (1) Tub files be placed in item code sequence to provide rapid access to files with minimum travel. The tub file area will require more travel by personnel than any other single operation in the tabulating department; (2) the first tub file (usually name and address cards) be placed at the starting point nearest to the customer order receiving point (mail room or order desk); (3) the reproducing machine be located as near the tub files as practicable since most machine utilization for this machine consists of reproducing cards for the tub files; (4) the last tub file be close to the machine area to reduce travel time to the equipment and at a point near the starting point for new orders; and (5) the card punch machines be placed in any available area away from the traffic flow as the principal use of these machines consists of changing master cards for price changes, slot changes, and other variable data. If practicable, location adjacent to the reproducing machine is recommended as this will reduce travel time between these 2 machines. Most of the cards originated on the card punch machines will be immediately reproduced on the reproducing equipment.

The proper layout of the machine room utilizes the following principles: (1) The machine work center will include the accounting machine, sorter, and the summary punch machine if one is used; and (2) if possible, the machines should be placed in a room separated by a partition from the tub room to prevent machine noise from interfering with the card pulling operation.

The installation of the tabulating equipment was dependent entirely upon the space assigned to the department in the majority of the companies studied. Consequently, space limitations dictated the layout to a great extent. An effective tabulating department layout installed at one medium sized wholesale food distributor is shown in figure 45. Space has been utilized to the utmost by installing equipment in the most effective position.

Improved Layout of Tub Files

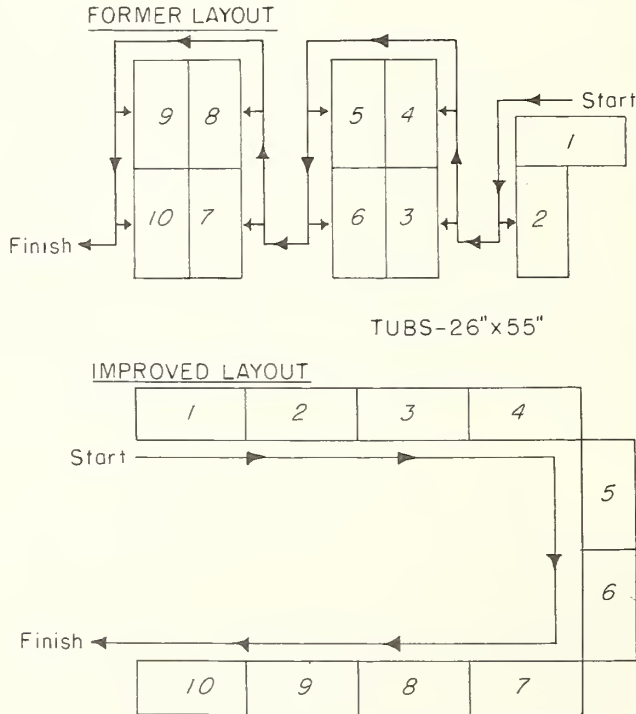
The proper layout of the tub files is important; figure 46 shows a partial floor plan illustrating the placement of the tub files with a recommended layout. In this operation, large orders (orders in excess of 1,000 cases per week) are pulled on a section-to-section basis with pullers stationed at various locations. Large size orders represent approximately 30 percent of the business in this firm. Table 23 shows the travel distance with the existing layout and with the recommended layout. A saving of 18 feet or more than 27 percent in walking distance would be accomplished with the recommended layout.



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NEG. 6232-58(5) AGRICULTURAL MARKETING SERVICE

Figure 45.--A good floor plan layout used by a wholesale food distributor cooperating in this study.



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Figure 46.--A tub file room layout with recommended improvements. Arrows show travel route of card pullers.

Table 23.---Travel distance required with the existing and recommended layout for the tub file room

Sequence followed in pulling cards	Existing layout			Recommended layout		
	Total	Productive	Nonpro-	Total	Productive	Nonpro-
	walk distance	walk distance	ductive walk distance	walk distance	walk distance	ductive walk distance
	Inches	Inches	Inches	Inches	Inches	Inches
Work table to first card tub.....	54	:	:	54	:	54
Card tub 1 - pulling front.....	60	:	54	60	:	60
Card tub 1 - unused front.....	28	:	28		:	
Card tub 2 - pulling front.....	57	:			:	
Walk distance to tub No. 3.....	42	:	42		:	
Card tub 3 - pulling front.....	55	:		55	:	55
Card tub 4 - pulling front.....	55	:		55	:	55
Card tub 4 - unused front.....	26	:	26		:	
Card tub 5 - unused side.....	26	:	26		:	
Card tub 5 - pulling front.....	55	:		55	:	55
Card tub 6 - pulling front.....	55	:		55	:	55
Walk distance to tub No. 7.....	42	:	42		:	
Card tub 7 - pulling front.....	55	:		55	:	55
Card tub 8 - pulling front.....	55	:		55	:	55
Card tub 8 - unused side.....	26	:	26		:	
Card tub 9 - unused side.....	26	:	26		:	
Card tub 9 - pulling front.....	55	:		55	:	55
Card tub 10 - pulling front.....	55	:		55	:	55
Change in lineup - place card tub		:			:	
No. 2 in place of card tub No. 10 1/.....		:		57	:	57
Total walk distance.....	827	:	270	611	:	557
		:			:	54

1/ Tub No. 2 in existing layout placed after tub No. 10 in recommended layout.

SHOULD TABULATING EQUIPMENT OR MANUAL METHODS BE USED

The question of whether tabulating equipment or manual methods should be used in a particular wholesale grocery business is principally based on cost. Taking into consideration the experience of the companies studied and other firms in the industry researchers estimated the costs of the 2 methods for wholesale food distributors having average sales volumes of \$250,000, \$500,000, and \$750,000 for a 4-workweek month.

Equipment Cost with Automatic Tabulating Equipment

The machines used in the tabulating departments have various modifications causing differences in the monthly rental costs of the equipment. The monthly rental for a basic minimum tabulating equipment installation is listed below:

<u>Equipment</u>	<u>Monthly rental including 10 percent Federal tax ^{1/}</u>
Accounting machine, 56 counter with list-tab, 88 type bars	\$434.50
Sorter	60.50
Card punch	66.00
Reproducing punch, without summary punch but with com- paring ability 80 counter	137.50
Total monthly rental	<u>\$698.50</u>

^{1/} Approximate rental effective in October, 1957 and subject to change. A number of States also include a tax on the rental of these machines.

The basic installation listed does not include a summary punching machine, which is useful where sales analyses are desired. The same results can be obtained by manual punching the desired data into cards for sales analysis.

In addition to machine rental costs, card costs will range from \$1.23 to \$1.27 per 1,000 cards. To determine card usage in a business where details are not available, annual sales volume is divided by \$5.00 which represents the average sales value per case. Card usage will total one card for each case sold plus 9 cards per year per customer for customer name and address.

Savings with Use of Automatic Tabulating Equipment

Some of the savings attributed to use of automatic tabulating equipment in the firms studied included the following: (1) A 2 percent increase in sales due to a decrease in out-of-stock conditions; (2) an increase in grocery turnover by 2 to 3 turns annually. In one instance, the annual inventory turnover was increased from 9-3/4 turns to 13 turns annually. In another instance, the inventory was reduced by 300 pallets for a saving of approximately \$22,500; and (3) a reduction in the number of physical inventories from a quarterly basis to semiannually. In one company the cost of taking physical inventories

was reduced \$1,313.70 annually. This was made possible because all invoices were "costed" automatically by the tabulating equipment. In another company the increase in office cost due to the addition of 4 card pullers with tabulating equipment was offset by the reduction of 3 men in the warehouse because warehouse item locations were printed on invoices by the tabulating equipment.

An analysis of costs incurred with manual methods and automatic tabulating equipment was made during a representative 4-workweek month for a wholesale food distributor operating in a modern 1-floor warehouse. Prior to installation of tabulating equipment the order book invoice method of sales accounting, inventory control, and shipment of merchandise was used. Merchandise was selected on a fixed slot basis in order book sequence in the warehouse. This company was using recommended manual methods before tabulating equipment was installed and annual business volume totaled \$6.5 million. The effect of installing tabulating equipment resulted in the cost changes shown in table 24.

Table 24.--Changes in monthly cost with use of automatic tabulating equipment compared with manual methods for a firm with \$500,000 sales per 4-week period

Element	: No. of : persons	: Dollars
Additional costs incurred with tabulating equipment:	:	:
Rental of equipment.....	:	698.50
Estimated card consumption at \$1.23 per 1,000.....	:	129.50
Personnel additions:	:	:
Tabulating department supervisor.....	1	475.00
Machine operator.....	1	200.00
Card pullers and key-punch operator.....	3	615.00
Total additional costs with tabulating equipment.....	<u>5</u>	<u>2,118.00</u>
Personnel savings with tabulating equipment:	:	:
Savings in warehouse personnel.....	3	915.00
Inventory and costing clerks replaced by card pullers..	4	720.00
Total reductions in cost with tabulating equipment.....	<u>7</u>	<u>1,635.00</u>
Net cost increase with tabulating equipment.....	<u>2</u>	<u>483.00</u>
	:	:

Calculations shown in table 24 indicate that a wholesale food distributor utilizing all known efficient factors applicable to manual methods will require a sales volume of about \$500,000 monthly for a basic installation of tabulating equipment to be economically feasible for inventory control and grocery billing. The point where tabulating equipment becomes more efficient than manual methods for a particular firm will depend upon the manual methods used, the percentage of business loss due to out-of-stock conditions, and the rate of inventory turnover.

To invoice approximately \$500,000 in monthly sales, it is necessary to use the machine from 25 percent to 30 percent of the time, leaving time available for other applications, such as accounts receivable, accounts payable, purchase order receiving and statistical analyses and general ledger accounting.

Data shown in table 25 indicate that as sales volume increases the savings with use of automatic tabulating equipment also increase. At a sales volume of \$250,000 for a 4-workweek period an estimated net profit of \$295 is made with use of recommended manual methods whereas an estimated net loss of \$248 is incurred with automatic tabulating equipment. At a sales volume of \$500,000 estimated net profits are nearly equal with the 2 methods whereas at a sales volume of \$750,000 estimated net profits with manual methods total \$8,710 and with automatic tabulating equipment total \$10,794.

Table 25.--A comparison of estimated expenses and net profit with manual methods and automatic tabulating equipment at various sales volumes

Item	Sales volume of : \$250,000 for : 4 workweeks		Sales volume of : \$500,000 for : 4 workweeks		Sales volume of : \$750,000 for : 4 workweeks	
	Manual methods	Tabulating equipment	Manual methods	Tabulating equipment	Manual methods	Tabulating equipment
	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Sales.....	250,000	250,000	500,000	500,000	750,000	750,000
Increase due to decrease in out-of-stock.....	:	5,000	:	10,000	:	15,000
Total sales.....	250,000	255,000	500,000	510,000	750,000	765,000
Total gross profit and other income.....	14,375	14,665	28,750	29,325	43,125	43,987
Operating expenses 1/.....	14,080	14,913	24,665	25,148	34,415	33,193
Net profit or (loss).....	295	(248)	4,085	4,177	8,710	10,794

1/ Details of fixed and variable expenses and costs as a percentage of sales are shown in Appendix tables 26, 27, and 28.

APPENDIX

✓1/ QTY. 2/ PK. COLUMN NO. 47 ITEM SP. 3/COST 4/EXT. 5/				✓1/ QTY. 2/ PK. COLUMN NO. 48 ITEM SP. 3/COST 4/EXT. 5/			
TOBACCO				SMOKING TOBACCO			
	10/20	Camels	.22	2.10	12/pkt	Beechnut	
	100	Cavalier		1.06	12/pkt	Bond Street	1.35
	10/20	Cavalier	.22	2.10	12/pkt	Bugler	1.45
	10/20	Chesterfield reg	.22	2.10	24/pkt	Bull Durham	.91
	10/20	Chesterfield, K/Size	.24	2.19	12	Geo. Washington	.91
	10/20	Embassy	.22	2.10	16	Geo. Washington	.09 .91
	10/20	Fatima, plain	.24	2.19	12	Granger	.68
	10/20	Fatima, tipped	.24	2.19	12/pkt	Half & Half	.09 .91
	10/20	H. Tareyton, reg.	.24	2.19	12/pkt	Kite	1.34
	10/20	H. Tareyton, K.S.	.25	2.29	12/reg	Prince Albert	.91
					12/pkt	Sir W. Raleigh	1.34
					12	Top Cig.]	1.45
							.09 .91

- 1/ Column for retailer checking of receipts from the wholesaler.
- 2/ Column for quantity ordered by retailer.
- 3/ Suggested selling price by the retailer.
- 4/ Wholesaler selling price to the retailer.
- 5/ Quantity multiplied by price per unit.

Figure 47.--Sample of a 2-column order book used for manual invoicing.

43 1/	STRAINED		STRAINED	
19759 2/	BEEF BROTH with BARLEY 24-4 3/4 oz.	2.14	19823	LIVER & BACON 24-3 1/2 oz. 4.90
19761	BEEF & LIVER SOUP 24-4 3/4 oz.	2.14	19825	VEAL 24-3 1/2 oz. 4.90
19763	BEETS 24-4 3/4 oz.	2.14	19827	PORK 24-3 1/2 oz. 4.90
19765	CARROTS 24-4 3/4 oz.	2.14	19829	CHICKEN 24-3 1/2 oz. 4.90
19767	CHICKEN SOUP 24-4 3/4 oz.	2.14	CHOPPED	
19769	CREAM OF TUNA FISH 24-4 3/4 oz.	2.14		CHOPPED 3.08 14.5 C.15
19771	CUSTARD PUDDING 24-5 oz.	2.14	19835	APPLE SAUCE 24-7 1/2 oz. 3.08

- 1/ Order book page number.
- 2/ Commodity code number for item.

Figure 48.--A 2-column order book that can be used for either manual or automatic tabulating equipment invoicing.

Description	Pack	Cost	SRP %	Wt	Vel	Record			ORDER NO. 4		ORDER NO. 8		ORDER NO. 2		ORDER NO. 1		
						1	2	3	4	Code	Qty	Code	Qty	Code	Qty	Code	Qty
INSTANT COCOA—41																	
Nestle	Everready	24-1/2#	6.40	33¢	19	15#	E	M									
									41-4125		41-4125		41-4125		41-4125		
Nestle	Everready	12-1#	5.70	59¢	19	15#	E	M									
									41-4180		41-4180		41-4180		41-4180		
CHOCOLATE SYRUP—41																	
Bosco		12-12oz.	3.48	37¢	22	15#	D	M									
									41-4305		41-4305		41-4305		41-4305		
Bosco		12-24oz.	5.98	63¢	21	33#	D	M									
									41-4310		41-4310		41-4310		41-4310		
Hershey		•24-5 1/2oz.	1.76	10¢	26	11#	D	M									
									41-4315		41-4315		41-4315		41-4315		
Hershey		•24-16oz.	4.23	23¢	20	29#	C	M									
									41-4320		41-4320		41-4320		41-4320		

- 1/ Wholesaler selling price to the retailer.
- 2/ Suggested retail selling price.
- 3/ Percent of gross profit to retailer if suggested selling price is followed.
- 4/ Weight per wholesaler selling unit.
- 5/ Velocity of sales.
- 6/ A column for the retailer to maintain a record of items and quantities ordered.

Figure 49.--An order book with a 4-part perforated tear strip for use with automatic tabulating equipment.

82					83					84				
COCOA					COFFEE (Cont.)					TEA PACKAGES				
CODE	ORDER HERE	SSP	%	COST	CODE	ORDER HERE	SSP	%	COST	CODE	ORDER HERE	SSP	%	COST
5310	BAKERS 4 in 1 Mix 12-1 lb. Cans(47c)....		22%	4.43	B5382	MAXWELL HOUSE Reg Grind M 24-1 lb. Cans(95c)....		10%	20.58	5458	LIPTON O.P. 12-1 lb. Pkgs.(1.59)....		19%	15.36
B5312	BAKERS Cocoa 24-8 oz. Pkgs.(39c)....		21%	7.41	B5392	WEBB'S Coffee Reg. 24-1 lb. Cans(95c)....		11%	20.35	B5460	LIPTON O.P. 24-8 oz.(81c)....		18%	15.96
B5316	BAKER'S 4 in 1 Cocoa Mix M 24-8 oz. Pkgs.(26c)....		21%	4.93	B5394	WEBB'S Coffee Drip 24-1 lb. Cans(95c)....		11%	20.35	B5462	LIPTON O.P. 48-4 oz.(42c)....		19%	16.20
5318	DROSTES 12-8 oz. Cans(65c)....		25%	5.85	B5384	HILLS BROS Regular Grind 12-2 lb. Cans(1.87)....		8%	20.47	5464	LIPTON O.P. 36-1 1/2 oz.(2 far 29c)....		18%	4.26
5320	HERSHEY M 12-1 lb.(79c)....		23%	7.32	B5386	HILLS BROS Drip Grind 12-2 lb. Cans(1.87)....		8%	20.47	5468	LIPTON Green 24-4 oz.(29c)....		20%	5.60
B5322	HERSHEY M 24-8 oz. Pkgs.(41c)....		23%	7.56	B5396	HILLS BROS Regular Grind 24-1 lb. Cans(95c)....		10%	20.70	5470	SALADA R.L. 12-8 oz.(81c)....		18%	7.98
5334	NESTLES Quik 6-2 1/2 lb. Cans(1.05)....		22%	4.90	B5398	HILLS BROS Drip Grind 24-1 lb. Cans(95c)....		10%	20.70	B5472	SALADA R.L. 24-4 oz.(42c)....		19%	8.10

- 1/ Column number in order book.
- 2/ Suggested retail selling price.
- 3/ Percent of gross profit to retailer if suggested selling price is followed.
- 4/ Cost - wholesaler selling price to retailer. Weight of wholesaler selling unit listed above the cost figure.

Figure 50.--A 3-column order book used with automatic tabulating equipment.

Table 27.--A comparison of sales and expenses with automatic tabulating equipment and manual methods for a firm having a sales volume of \$500,000 for a 4-workweek month

	Estimated with use of manual methods				Estimated with use of automatic tabulating equipment				
	Fixed expenses		Variable expenses		Fixed expenses		Variable expenses		
	Labor 1/	Other 2/	Labor 3/	Other 4/	Labor 1/	Other 2/	Labor 3/	Other 4/	
No.:	Dol.:	No.:	Dol.:	No.:	Dol.:	No.:	Dol.:	No.:	Dol.:
Income and expense		Total		Percent of sales		Total		Percent of sales	
Sales.....									
Increase due to decrease in out-of-stock.....									
Total sales.....									
Cost of sales.....		478,750-							
Gross profit.....									
Other income 5/.....		(7,500)							
Total profit and other income.....									
Operating expenses:									
Warehouse.....	1:	560-	21:6,395-	1:070-	1:	560-	18:5,480-	1:070-	8,725-
Delivery.....		3,145-	7:2,130-	1:140-		3,145-	7:2,130-	1:140-	6,415-
Sales, office and administrative costs.....									
Exclusive of grocery billing operation.....	12:	4,435-				2,325-			6,760-
Billing operation:									
Clerical.....			4:	720-					
Rental of tabulating equipment and cost of supplies.....									
Occupancy costs.....									
Total operating costs.....	13:	4,995-	32:9,245-	2:210-		4,995-	30:8,900-	2:210-	25,148-
Net profit.....									4,177-

1/ Fixed expenses - labor represents warehouse supervision, branch manager and all buying, selling and office personnel, excluding individuals reported in the variable expense - labor column representing grocery invoice billing clerks.
2/ Fixed expenses - other represents those expenses not changing with changes in sales volume, including depreciation, rent, and insurance.
3/ Variable expenses - labor represents warehousemen and delivery personnel, directly influenced by increases and decreases in sales volume as well as persons used in grocery billing and tabulating operations.
4/ Variable expenses - other includes expenses increasing or decreasing with corresponding changes in sales volume.
5/ Income from purchase discounts and advertising.

